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## Original Communications

### WHAT THE GYNECOLOGIST SHOULD KNOW ABOUT UROLOGY\*

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IN THE past fifteen years I have spent considerable time and energy in calling the attention of the urologist to a few points that he has been overlooking in his special field. Although I cannot boast of a ready and enthusiastic reception for these ideas, I have had sufficient faith in the essential honesty and sportsmanship of the urologist to believe that he would not discriminate against a gynecologist if it could be demonstrated that his theories on urology were workable amongst men who are accustomed to exact results.

This evening I feel quite at home, meeting with those of my own guild and talking on a theme the importance of which is constantly being forced upon me as a gynecologist. Those of you who have been in gynecologic work for a quarter of a century know that great changes have occurred in that time. If we consider but the one symptom of backache, so common in women, we can easily show great progress in our diagnosis and treatment of this condition. As a gynecologist I am sorry to confess that, in far too high a percentage of cases, many of my fellow-workers are still apt to refer this symptom to strictly gynecologic lesions, and that the progress we have made in our interpretation has been largely imposed upon us by workers in other fields, notably by the orthopedist and urologist.

What should the gynecologist know about urology? The close relationships embryologically and anatomically between the genital and the urinary tract not infrequently result in simultaneous disease of both, and too often the signs and symptoms of disease in the one tract are misinterpreted as belonging to the other.

\*Read before the Brooklyn Gynecological Society, March 4, 1927.

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In a recent report from the Presbyterian Hospital, in Philadelphia, Laws (Laws, George M.: Ureteral Obstruction in Women, *AM. JOUR. OBST. AND GYNEC.*, 1926, xii, 802) says: "More than 30 per cent of patients who come to a gynecologic service complain of urinary symptoms." Although I have not analyzed statistics bearing on this point, I consider this statement a conservative one.

The older gynecologists present can recall the many instances in which they have performed an extensive gynecologic operation with the utmost confidence that in so doing they would relieve the distressing bladder symptoms which formed one of the patient's chief complaints, only to experience great disappointment in finding that the urologic symptoms persisted.

One thing that the gynecologist should know about urology is that symptoms referable to the urinary tract usually mean disease of that tract. Perhaps the first thing that the gynecologist, as well as the internist and the general surgeon, should remember, in trying to arrive at a diagnosis in cases with obscure abdominal or pelvic symptoms, is that all patients possess a urinary tract.

Since learning of the great frequency of ureteral stricture and of the manifold symptoms and serious ill health for which this lesion may be responsible, I have been amazed at the number of patients who can be restored to reasonably good health by proper treatment. I have also learned that not a few of them had been treated by internists as neurasthenies, or had been submitted to futile treatments for gastroenterologic complaints, or to operations for supposed gall bladder, appendiceal, or genital tract diseases.

The gynecologist, as well as every abdominal and pelvic diagnostician, should recognize as an important fact that serious disease may exist in the urinary tract with but few or absolutely no indications of the trouble from the urinalysis. Failure to grasp this point has been one of the most fertile sources of error in our work of the past.

Elusive ulcer of the bladder, one of the worst of human afflictions, is associated with what is thought to be an apparently normal urine, unless the patient is so unfortunate as to have in addition a stricture of the ureter which has produced a secondary pyelitis with its characteristic urinary picture. Over half of my elusive ulcer patients have ureteral stricture, but fortunately only a few of them have developed pyelitis.

The urine catheterized from the bladder in the elusive ulcer case practically always contains an occasional leucocyte and erythrocyte, but in the past such findings have been ignored as of no pathologic significance and the bladder lesion has been overlooked.

In patients suffering from ureteral stricture I have found hydro-nephroses with a content as high as 360 c.c., but without a sign of trouble in the urine. Diagnosticians must realize that a trace of

albumin, an occasional cast, an occasional white or red blood cell in the urine usually means some derangement in the urinary tract, and that although these signs may be evanescent and indicate only some temporary disturbance, or be an expression of some recognizable systemic derangement, yet they may indicate a serious and chronic lesion in the urinary tract.

After these introductory remarks, which belong to all who are interested in abdominal or pelvic cases, let us consider briefly a few points which should interest the gynecologist in particular.

*Dysmenorrhea*, one of the most common of all gynecologic complaints, is usually an expression of an obstructive narrowing within the uterus or of inflammatory changes involving the internal genitalia. All gynecologists of experience, however, know that in many cases of dysmenorrhea it is impossible to detect any evidence of inflammatory disease about the genitalia, any malposition of the pelvic organs, any hypoplasia, or any obstructive lesions within the uterus.

If one wishes to know of the complicated views on this subject he needs but to turn to any of our modern textbooks on gynecology to find the many, and sometimes contradictory, theories advanced to account for this troublesome symptom.

All of us have seen curative results in cases of dysmenorrhea from the use of simple common-sense measures—proper diet, exercise, and rest. Such measures are likely to prove effective more particularly in high school girls, who acquire a dysmenorrhea toward the end of the school year, when they are worried over their studies and examinations, and are perhaps indulging in too strenuous athletics and especially in too many night parties. We do not even make a pelvic examination in such cases, for the history points to the probability of an atonic condition of the uterine musculature, resulting in flexion of the fundus on the cervix with temporary stenosis, which is quickly corrected by restoring tone to the general musculature by sane methods of living.

Many of these patients also are cured by one or more of the numerous operations selected after due consideration of the anatomic conditions present. Dilatation and curettage is perhaps the simplest of these operative procedures and the one most frequently used. But in passing I would say that for many years I have warned my students against the use of the curette unless there is some special indication for a microscopic examination of the endometrium. If a curettage is done, a gauze rubber cigarette drain should be left in the canal for four or five days, until the epithelium has had time to cover the raw areas left by the curette; otherwise the last state of the patient is likely to be worse than the first, owing to the formation of multiple stenoses where only one existed before. The judicious use of the stem pessary has been most helpful in some cases. Dudley's dissection

operation, Pfannenstiel's excision of the transverse wedge, and the suprapubic operations for the correction of malposition will often prove effectual.

But what I wish to emphasize is that all gynecologists of experience have seen many cases in which these operations, individually and collectively, have utterly failed to give relief.

As gynecologists one thing we should know is that our failure in many of these instances is due to the fact that the dysmenorrhea is due not so much to a gynecologic as to a urologic lesion. In the future in all such cases let us not consign these patients to that favorite medical junk heap—psychoneurosis—until we have first excluded the urinary tract as a possible source of their trouble.

The day of preventive medicine is well upon us, and it is high time that we take stock of our surgery and by careful follow-up records learn how much of it is worse than useless; and then, if possible, substitute some simpler methods that will yield better results.

In the nosography of ureteral stricture in women it is rather characteristic that in its early stages the pain occurs chiefly and often solely at the time of the menstrual period, or during the period of premenstrual congestion. Later on, however, the stricture area becomes so narrow that its effects are felt throughout the month, and are exaggerated by anything that increases the local congestion, such as the menstrual epoch, getting chilled, getting the feet wet, overexertion, or a prolonged rough automobile trip.

Ureteral stricture is a disease of such frequent incidence that it behooves us to bear it in mind in seeking the cause of any case of dysmenorrhea.

Experience soon teaches one so many peculiarities about a dysmenorrhea that depends upon an ureteral stricture that there is rarely any excuse for overlooking it. Essential dysmenorrhea, dysmenorrhea originating from pelvic disorders outside the uterus, or from uterine tumors or misplacements, and dysmenorrhea of urologic origin are all of such common incidence that they are bound to occur in various combinations in a certain number of patients.

When it is quite evident that our patient has an ureteral stricture, which no doubt is contributing to her dysmenorrhea, but we find in addition a gross pelvic lesion, such as a large fibroid, an operation may be advisable as the first line of treatment, but even then it is a great satisfaction to be able to tell the patient about how much or how little she may expect from it as regards relief from her dysmenorrhea.

On the other hand, when it is uncertain how much the genital disorder is contributing to the patient's discomforts, the only rational procedure is to care for this lesion first and await results, knowing that the operation can be done later if necessary.



But how shall we differentiate the various dysmenorrheas? One soon learns to suspect the ureteral origin of a dysmenorrhea simply from the patient's history. When I ask a patient of what she complains and she answers by directing her finger-tips down behind both Poupart's ligaments and says, "I have pains in the ovaries with my menstrual periods," experience has taught me to suspect that she has ureteral stricture. Further points in her history strengthening this lead are as follows: These pains may have come on after a year or more of normal or relatively painless periods, or after childbirth. Or they may have come on before marriage and have not been relieved by childbearing. For some months or years the pain has been monolateral, later becoming bilateral. The pain at first may have been strictly premenstrual and menstrual but gradually it has become continuous, and is exaggerated with the period. The "ovarian" pain is accompanied by backache high in the posterior flanks. This backache was at first a menstrual epoch affair, sometimes beginning before the "ovarian" pain set in but later becoming more or less continuous. There is considerable general soreness and pain over the abdomen, at first occurring at the menstrual epoch, but gradually becoming more or less continuous. There are often associated gastrointestinal symptoms, varying from slight accumulations of gas to severe nausea and vomiting, attacks of diarrhea, or of mucous colitis. In many of these women the pressure of corsets or of an abdominal binder cannot be tolerated. The pain in the back is often worse at night and the patient has found it helpful to sleep with a pillow under the flank or with a flannel blanket over the waistline.

With one or more of the above features there is the additional history of bladder irritation in three-fourths of the stricture cases. This vesical distress may be one of the chief points complained of by the patient, or the bladder history may be elicited only by careful questioning. The patient often says she has no bladder symptoms except, perhaps, "a little frequency at the time of the menstrual period due to the increased nervousness at that time"; or she may answer that her bladder does not bother her except when she is nervous or excited or when she "catches cold" or gets her feet wet.

After obtaining a history with many of the above suggestive features we are put on our guard when proceeding to the physical examination and have no trouble in remembering that the patient has a urinary as well as a genital tract.

The abdominal examination of patients with ureteral stricture almost always reveals tenderness in the kidney regions, and even more often tenderness on pressure over the ureters in the abdominal spindle region (Legge's point), or at the pelvic brim crossing (Morris' point).

If the dysmenorrhea is of ureteral rather than of genital origin, the ureters will be most sensitive to pressure over their course through the

broad ligament, and on palpation in this region the patient often exclaims, "That is my menstrual pain." In cases with bladder symptoms this manipulation also causes the desire to void. If the patient has had rectal pressure or desire for frequent stools, uterine contraction or "after-birth pains," vaginal pressure pains, or pains of obscure origin in the perineum, these are frequently elicited by pressure on the pelvic ureter.

*Ovarian neuralgia* is far too common a diagnosis which has been responsible for the sacrifice of literally thousands of normal ovaries. In not a few cases this diagnosis has been made on the strength of the patient's history and on the fact that the only abnormal physical finding on palpation is an apparently tender ovary. At other times, when some other abnormality is found, especially a malposition, the gynecologist purposes to correct it and at the same time to remove the painful ovary, but at operation the ovary appears so normal that he decides to leave it in its place. Subsequently, however, he regrets his conservatism, because the patient's symptoms persist and the ovary still seems to be the seat of the pain. Now, the explanation for many cases in this category is that the ovary and a tender ureter have both been grasped between the palpating fingers, and if one simply bears in mind the possibility of mistaking ureteral for ovarian tenderness one can easily differentiate the two conditions. In the former case, on bimanual palpation the ureteral region can be avoided and the ovary carried toward the midpelvis and compressed with little or no pain. If now the abdominal hand be left out of action, and the broad ligament portion of the ureter be gently stroked, with the vaginal palpating finger, in ureteral cases the patient will complain of the characteristic pains. If a doubt still exists, the ureter should be tested with the special methods that will reveal stricture if it is present. So far as I know, Howard A. Kelly was the first to emphasize the importance of palpation of the pelvic ureter, and A. M. Judd, of Brooklyn, has repeatedly called our attention to this point.

*Dyspareunia.* Painful coitus is a very common phenomenon. Because of the patient's modesty and our disinclination to ask about this symptom it is often left out of our gynecologic history, although it may be an important factor in the patient's ill health. It is not within the province of this paper to discuss in detail the complicated features of vaginismus and dyspareunia. One can usually elicit from the patient whether her discomforts during coitus are external or internal. If they are external, physical examination usually reveals a cause or the sexual history points to some reason for a psychic repulsion. If the pain is high up or internal, one sometimes finds a painful sear in the cervix, or more often an inflammatory infiltration

of the uterovesical, uterosacral or broad ligaments; or an inflammatory involvement, a tumor, or a displacement of the internal genitalia may be present.

Not infrequently when we have failed to ask the patient about her sexual life, and get to the point in the physical examination of palpating the pelvic ureter, she at once volunteers, "That is the pain I have with the sexual act." Sometimes she leads up to the question on dyspareunia by saying, "That is the pain I have on using a douche nozzle, or when anything touches me there." If she has had bladder symptoms associated with her dyspareunia she often says that the sexual act is followed by a night of unusual bladder frequency and discomfort. If gastrointestinal symptoms, such as gas formation, belching, and abdominal tenderness have been prominent, these are sometimes exaggerated for as long as twenty-four hours after coitus. Not a few patients have given up the sexual life because of painful coitus, which was found later to be due to ureteritis, and one patient said this had led to her divorce. The one point I wish to emphasize here is that as gynecologists you should know that *many cases of serious dyspareunia are of urologic origin*. I am not yet ready to make the statement that dyspareunia is more often dependent on disease of the urinary tract than on disease of the genital tract, but I shall not be surprised if future observation shows this to be true.

By following the diagnostic methods outlined above in the discussion of ovarian neuralgia one can usually determine with a fair degree of certainty whether the dyspareunia is chiefly of ureteral origin, and when in doubt, the therapeutic test is often the deciding factor in the diagnosis.

*Descensus symptoms.* Gynecologists are familiar with the complaint "falling of the womb," or as some patients express it, "My organs feel as if they are coming out."

Such a complaint on the part of a nullipara should at once arouse the suspicion of ureteral stricture. We do see an occasional case of cystocele or of prolapsus uteri in the unmarried and in the nulliparous woman, but they are exceedingly rare and are easily diagnosed on examination. If, however, her distress is caused by highly sensitive ureters, physical examination will fail to show any displacement of the genital organs, and if we have the urinary tract in mind, we can easily elicit the symptoms by pressure over the tender ureters in the broad ligaments.

In some multiparae who complain of the symptoms typical of descensus the prolapsus becomes exaggerated and causes symptoms only after a number of years after childbirth. In such cases the giving way of the pelvic floor has been delayed, and there is frequently a history of sudden strain or trauma, or of prolonged overexertion immediately preceding the final prolapsus.

Our interest here centers on the multiparous patient who comes with such a typical history, but who on physical examination presents a well-preserved pelvic floor and internal genitalia in apparently perfect position. Formerly we were too apt to find an enlarged cervix, or what we thought was slight descensus or an overstretched outlet, and to proceed to operation in the hopes of giving relief. Experience, however, has taught us that many of these patients simply need urologic treatment.

In some cases which are doubtful from the gynecologic viewpoint we can often give perfect relief by using a well fitted pessary. If the pessary test is successful but the patient prefers not to be bothered with wearing and caring for it, we are then justified in operating, but only after we have excluded the presence of ureteritis.

Even in the purely ureteral case the pessary often gives temporary and partial relief by splinting the pelvic tissues and preventing the jarring of the tender ureteral broad ligament regions when the patient is active. However, it will be found in most of the ureteral cases that the relief is only partial and the back aches over the kidney regions, the referred pains in the hips and thighs, the abdominal soreness, and particularly the bladder symptoms persist.

*Menorrhagia.*—We occasionally see a patient complaining of menorrhagia in whom the most careful examination of the genital tract fails to reveal a cause for the excessive bleeding. Such patients often present a definite dyscrasia, the cause being found in their methods of living, or in some serious local or constitutional disease. Ureteral stricture, with its damage to the renal function by obstruction, and the consequent toxemia affecting the mental, nervous, gastrointestinal, and other functions, is one of the most fertile causes of a dyscrasia, and not a few cases of menorrhagia have been relieved by the restoration of the general health through the establishment of adequate renal drainage.

*Urinary Tract Symptoms.*—This discussion of what the gynecologist should know about urology would be far from complete without a brief consideration of purely urologic symptoms. Indeed my early special interest in urologic problems was largely prompted by the oft-repeated question by visitors in Kelly's gynecological clinic: "What do you do for women who are always complaining of bladder symptoms and whose urine shows nothing abnormal?"

The quest for the answer to this problem first led to the discovery of the important rôle played by focal infections in urinary tract complaints. (Hunner: *Chronic Urethritis and Chronic Ureteritis Due to Tonsillitis*, Jour. Am. Med. Assn., 1911, lvi, 1907.)

Twenty-five years ago it was commonly known that in many cases of so-called "neurosis of the bladder" the patients had only a chronic urethritis or a chronic trigonitis. These were then considered to be

sequelae of a past gonorrheal infection, and many patients had their symptoms relieved as if by magic by a few applications of solutions of silver nitrate. Others, however, were not benefited at all, or only partially or temporarily, and because in some the joints were affected and because the salicylates sometimes relieved both the arthritic and the urinary symptoms, we learned to speak of "rheumatic" trigonitis or urethritis as a classification distinct from the gonorrheal variety. We now see more patients with chronic trigonitis and chronic urethritis whose symptoms we relieve by basing our treatment on the focal infection theory rather than on the postgonorrheal origin.

As gynecologists you are probably saying that you can diagnose the gonorrheal cases by the appearances about the urethra and vulva. Unfortunately, this cannot be done, for the red points about the vulvo-vaginal glands formerly supposed to be diagnostic of a previous gonorrhea are often the sequelae of distant focal infections. A cervicitis with leucorrhea may likewise be due to distant foci of infection and logical treatment in such cases includes the removal of the original source.

*Incontinence.*—One urologic symptom in which sooner or later all gynecologists are forced to take an interest is that of urinary incontinence. We cannot enter into an exhaustive discussion of this troublesome symptom, but as gynecologists we should know that many patients have not only urinary frequency but actual incontinence because of pathologic changes in the urinary tract due to distant focal infections.

Of over 250 of my patients complaining of this symptom the incontinence in many has apparently been due to impulses arising in areas of ureteral stricture, and excellent results have been obtained by treating them on this basis.

Enuresis in children, which persists beyond the first decade, is often due to a focal infection causing an inflammatory lesion in the lower ureters, the trigonum, the urethra, or in this entire region. The urine in such cases is usually normal. Removal of the focus even without urologic treatment of the infection results in cure in some cases. In others a few applications of silver nitrate solution to the reddened trigonum, or dilatation of the urethra, with applications of silver nitrate, are followed by relief. In still others the inflammation has involved one or both of the lower ureters and these have to be dilated before a cure is effected.

#### SUMMARY

Gynecologists must bear in mind that ureteral stricture is one of the most common lesions of the abdominopelvic cavity. By virtue of the usual position of the stricture in the lower pelvis and its relations to the pelvic sympathetic nerves, and by virtue of its effects on the



renal function, its symptoms are more varied than those of any local disease with which we are familiar.

It follows that in any obscure train of symptoms involving the abdominal, pelvic, or hip regions, ureteral stricture must always be borne in mind.

The existence of such obscure symptoms together with others referable to the bladder places a special obligation on the diagnostician to investigate the urinary tract most carefully. *The absence of pathologic elements in the urine does not always give the urinary tract a clean bill of health.*

In the case of any patient who, despite one or more pelvic operations still complains of her original symptoms, it is incumbent upon the gynecologist to make a meticulous survey of the urinary tract.

MEDICAL ARTS BUILDING.

#### A REPORT OF FIVE YEARS' ACTIVITIES OF THE MATERNITY SERVICE, SECOND (CORNELL) DIVISION, BELLEVUE HOSPITAL\*

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THE predominant motive in presenting this report is to show that an obstetric service in a general hospital may be conducted with as little loss of life from childbirth as occurs in institutions devoted specifically to maternity work. In order to obtain such results, unusual safeguards against sepsis must be enforced. Nearly 50 per cent of the patients admitted to the Bellevue Hospital obstetric wards have had no prenatal supervision by us, and many of the women have not the simplest notions of antenatal hygiene—in some cases marital relations are continued to the very day of labor. A number of the patients are likewise admitted after attempts at operative delivery by private physicians.

The hospital protects the obstetric service by prohibiting vaginal examinations by ambulance surgeons or admitting officers and by sending to the gynecologic wards all incomplete abortions and all patients admitted more than twenty-four hours postpartum, considering these groups as possibly septic. (In New York State one-third of the fatal septic cases follow abortions.)

In our effort to protect the patients against sepsis, we have conducted normal deliveries without rectal or vaginal examinations, and we make the few vaginal examinations necessary in abnormal cases with antiseptic, as well as aseptic, precautions.

\*Read at a meeting of the New York Obstetrical Society, October 11, 1927.

Operative intervention has been as conservative as was consistent with the patient's welfare.

This report covers the work of the Second (Cornell) Division at Bellevue Hospital, which has charge of the obstetric wards for six months of each year, from February 1 to August 1. There are two large wards in the main building, which provide beds for sixty adult patients. In addition there is a building two blocks away with an indoor service of fifteen beds and an outdoor service of about thirty cases a month. The midwives reside and are taught in this building. We have, then, an average outdoor service of about 30 patients a month and an indoor service of 147. Practically all of the more serious cases occurring on the wards at the School for Midwives are transferred to the main building.

From 1922 through 1926 there were 4396 indoor deliveries. Seventeen hundred and seventy-two of the patients attended our prenatal clinic, 1527 had no prenatal care, and 982 were given prenatal care by the School for Midwives. In 115 cases the histories were incomplete in regard to prenatal care.

There were 2505 multiparae and 1841 primiparae. The parity in 50 cases was not recorded.

Seventy-three per cent of the presentations were occiput anterior, 14 per cent were occiput posterior, and 5 per cent were breech. There were 10 face presentations, 23 scapular, and 1 compound. In 285 cases the presentations were not recorded.

There were 55 sets of twins and 2 sets of triplets. All of the triplets weighed under 1500 grams and all died.

During the five years, we delivered a total of 5520 patients, 4396 indoor and 1124 outdoor. There were 33 obstetric deaths and 15 deaths from medical or other causes. These have been classified according to the International Code as used by the United States Census Bureau. Two of the obstetric deaths occurred on the outdoor service. Table I and brief individual summaries of these 48 deaths are here given and in addition, I would like to discuss them in groups according to the principal cause of death.

#### MATERNAL MORTALITY—OBSTETRICS

##### *Puerperal Septicemia—8 Deaths:*

A. M. 5/5/22. Para i. At term. Spontaneous delivery. No vaginal or rectal examinations. Temperature from third to tenth day. Three hundred c.c. polyvalent antistreptococcic serum. Wassermann 4-plus.

M. M. 4/11/22. Para iv. At term. Spontaneous delivery. No vaginal or rectal examinations. Intrauterine culture showed *Streptococcus hemolyticus*. One hundred and fifty c.c. antistreptococcic serum. Lobar pneumonia. Temperature from third to sixteenth day.

H. H. 5/9/22. Para i. At term. Spontaneous delivery. No vaginal or rectal examinations. Two hundred c.c. antistreptococcic serum. Temperature from fifth to tenth day. Home A. O. R. on twelve day. Returned few days later to gynecologic ward where she died.

M. F. 2/26/22. Para vi. At term. Delivery by breech extraction on the outdoor service. Transferred to the hospital four days postpartum with a high temperature. Died on the eighth day postpartum.

E. A. 5/22/23. Para iii. Premature delivery at home. Manual removal of the placenta attempted at home by private physician. Admitted four hours postpartum with placenta partially retained. Died of peritonitis on the fourth day.

TABLE I. MATERNAL DEATHS IN 5520 DELIVERIES, 1922-1926

DEATHS FROM OBSTETRIC CAUSES							DEATHS FROM MEDICAL CAUSES						
	1922	1923	1924	1925	1926	TOTAL		1922	1923	1924	1925	1926	TOTAL
Sepsis	4	1	3	0	0	8	Pneumonia Antepartum	2	2	2	0	2	8
Premature Separation Placenta	1	3	0	0	0	4	Pneumonia Late Postpartum	0	0	1	0	0	1
Placenta Previa	1	0	1	1	1	4	Cardiac Disease	0	0	0	0	1	1
Postpartum Hemorrhage	0	0	0	2	0	2	Epilepsy	1	0	0	0	0	1
Embolus	0	0	1	0	1	2	Tuberculosis	0	0	0	1	0	1
Ruptured Uterus	0	0	0	1	0	1	Tuberculous Meningitis	2	0	0	0	0	2
Eclampsia	6	0	0	1	1	8	Meningitis	0	0	0	1	0	1
Toxemia	1	1	0	2	0	4		5	2	3	2	3	15
	13	5	5	6	3	33							

1124 outdoor cases, 2 obstetric deaths or 0.4%  
 4396 indoor cases, 31 obstetric deaths or 0.7%  
 5520 in- and outdoor cases, 33 obstetric deaths or 59%

1124 outdoor cases, no medical deaths  
 4396 indoor cases, 15 medical deaths or 0.27%

C. L. 7/6/24. Para i. At term. Admitted after attempted forceps delivery by private physician. Delivered by high forceps of 4000 gram stillborn child. Died of peritonitis on fourth day.

J. D. 4/15/24. Para i. At term. Admitted thirty-nine hours after labor had started. One rectal examination outside. Spontaneous delivery. Temperature from third to eighteenth day. Pleurisy developed on twelfth day. Death on the eighteenth day. Autopsy: endometritis; general peritonitis; double empyema.

B. B. 4/8/24. Para i. At term. Delivered at home by ambulance surgeon. Admitted with retained placenta. Manual removal. Temperature from first to twenty-sixth day. Blood transfusion on eighth day. Autopsy: acute endometritis; general peritonitis; chronic nephritis.

*Eclampsia—8 Deaths:*

T. V. 2/22/22. Para i. Six months pregnant. Admitted in coma after 6 convulsions at home. Had a total of 14 convulsions. Died ten hours after admission, undelivered.

H. P. Para v. Seven months pregnant. On admission B. P. 220/80. Albumin 4-plus with casts. One convulsion. Induction by bag. B. P. dropped 120 points after expulsion of bag twelve hours later. Died at once. Stillborn baby delivered postmortem.

I. S. 5/10/22. Para i. Six months pregnant. Admitted in coma after 4 convulsions at home. Induction by bag. Spontaneous delivery of macerated fetus. Died eighteen hours after delivery.

E. S. 3/24/22. Para iii. Seven months pregnant. Admitted after 3 convulsions at home. Induction by bag. Spontaneous delivery. Had a total of 10 convulsions. Died eighteen hours after delivery.

J. L. 5/30/22. Para vii. Seven and a half months pregnant. Admitted in labor. Albumin 4-plus. B. P. 225/120. Spontaneous delivery of twins. Seven convulsions postpartum. Died six and a half hours after admission.

M. McN. 5/22/22. Para ii. Admitted in coma after delivery of twins at home. Three convulsions before admission. Total of 9 convulsions. Died seventeen hours after admission.

J. A. 2/24/25. Para ii. Nine months pregnant. In coma on admission. B. P. 164/126. Two convulsions. Died eighteen hours after admission, undelivered.

E. R. 4/7/26. Para xiii. Twenty-seven weeks pregnant. Admitted with albumin 4-plus. B. P. 260/150. Had chronic nephritis. Membranes ruptured artificially. Went into coma after 2 convulsions. Died eight and one-half hours later, undelivered. Diagnosis: uremia.

*Toxemia of Pregnancy—4 Deaths:*

R. L. 1/13/22. Para i. Nine weeks pregnant. Vomiting of pregnancy. Therapeutic abortion twenty-two days after admission. Died same day. Had symptoms of acute yellow atrophy.

A. D. 3/15/23. Para vii. Six months pregnant. Admitted acutely ill with history of vomiting for three weeks. Sugar by vein. Died undelivered a few hours after admission. Symptoms of acute yellow atrophy.

A. O. 5/7/25. Para i. Thirty weeks pregnant. Wassermann 2-plus. History of vomiting continuously for five days. Spontaneous delivery. Died sixty-four hours postpartum. Symptoms of acute yellow atrophy.

M. R. 5/25/25. Para i. Thirty-eight weeks pregnant. Albumin 4-plus. B. P. 160/110. Induction by bag. Died immediately after anesthesia was started for forceps delivery. Living child delivered postmortem. Autopsy: chronic nephritis; chronic endocarditis; chronic myocarditis.

*Placenta Previa—4 Deaths:*

B. V. H. 5/2/22. Para i. At term. Complete placenta previa. Cesarean section. Temperature from second to tenth day. Embolism of vessels of leg.

M. T. 2/11/24. Para iv. On outside ward with erysipelas. Profuse bleeding. Induction by bag. Delivery by version and breech extraction. Uterus packed. Temperature from first to fifth day. Peritonitis.

A. N. 4/11/25. Para ix. At term. Bleeding for past month. Induction by bag. Delivery by version and breech extraction. Uterus packed. Hemorrhage behind packing. Death two hours after delivery.

A. L. 6/21/26. Para iii. At term. Central placenta previa. In shock on admission. Hypodermoclysis 1000 c.c. Delivery by version and breech extraction. Uterus packed. Hemorrhage behind packing. Died two and one-half hours after delivery while being transfused.

*Premature Separation of the Placenta—4 Deaths:*

M. G. 3/8/22. Para xv. Seven months pregnant. Admitted in shock. Spontaneous delivery. Transfusion. Died eighth day, apparently of an embolus.

G. T. 3/28/23. Para vi. At term. Induction by bag. Spontaneous delivery. Uterus packed. Profuse hemorrhage through packing. Shock. Died seven hours postpartum. Toxic on admission—B. P. 158/110.

D. A. 5/15/23. Para vi. Toxic—B. P. 220/140. Albumin 3-plus. Had been bleeding nine hours before admission. Induction by bougie and packing, followed by bag. Delivery by version and breech extraction. Shock.

S. B. 7/19/23. Para viii. Seven and one-half months pregnant. Membranes ruptured. Induction by bag. High forceps delivery of stillborn child. Manual removal of placenta. Uterus packed. Shock. Death one hour after delivery. Autopsy: tear of lower uterine segment.

*Intrapartum Hemorrhage—1 Death:*

R. B. 2/25/25. Para ii. At term. Admitted after delivery of first twin at home. Second twin in utero. In shock. Died fifteen minutes after admission, undelivered.

*Postpartum Hemorrhage—1 Death:*

M. G. 2/3/25. Para ii. Thirty-eight weeks pregnant. Admitted in second stage of labor. Spontaneous delivery. No vaginal or rectal examinations. Temperature started to rise after delivery. Sixth day pneumonia. Death on tenth day. Pulmonary embolism.

*Puerperal Embolus—2 Deaths:*

M. B. 2/22/24. Para i. At term. Low forceps delivery. Postpartum hemorrhage. Uterus packed. Pyelitis. Temperature from third to eleventh day, with scarlatinal rash and desquamation. Death on fifteenth day. Embolus and cerebral hemorrhage left temporal lobe of brain.

A. F. 3/28/26. Para i. At term. Attempted forceps delivery by private physician at home. Delivered by high forceps of stillborn child, weighing 4300 grams. Temperature below 100° until sixth day, when patient suddenly died of pulmonary embolus.

*Ruptured Uterus—1 Death:*

M. C. 3/27/25. Para x. At term. Delivered on the outdoor service by version and breech extraction. Admitted in shock three and one-half hours postpartum. Manual removal of placenta. Gum glucose and transfusion. Hysterectomy. Died thirty hours later.



## MATERNAL MORTALITY—MEDICAL

*Antepartum Pneumonia—8 Deaths:*

I. G. 2/8/22. Para i. At term. Admitted with temperature 101.6°. Pulse 120. Intensely cyanotic. Lobar pneumonia. Spontaneous delivery. Death four days later.

A. D. 2/1/22. Para i. At term. Transferred from medical ward with temperature 102.4° and pulse 112. Lobar pneumonia. Spontaneous delivery. Anti body solution 3 times. Died five days postpartum.

C. I. 3/10/23. Para ii. At term. Transferred from medical ward with temperature 102.4° and pulse 100. Lobar pneumonia. Low forceps delivery. Death same day.

C. C. 2/19/23. Para iv. At term. Ill eight days before admission. Bronchopneumonia. Breech extraction without anesthesia. Death five days later of pulmonary edema.

S. L. 4/3/24. Para vii. Thirty-eight weeks pregnant. Admitted with temperature 101°. Mitral stenosis. Spontaneous delivery with no anesthesia. Consolidation of right lower lobe next day. Death two days later.

J. McD. 3/8/24. Para i. Eight and one-half months pregnant. Admitted with temperature 101.6° and pulse 120. Pneumonia and pyelitis. Fourth day blood culture positive for *Staphylococcus hemolyticus*. Low forceps delivery on ninth day. Death next day.

M. H. 6/4/26. Para i. At term. Bronchitis on admission. Mid-forceps delivery L. O. P. One oz. of ether. Consolidation second day postpartum. Death on fifth day of lobar pneumonia.

C. C. 3/23/26. Para iii. Thirty-six weeks pregnant. Admitted with lobar pneumonia. Spontaneous delivery shortly after admission. Death few hours later.

*Postpartum Pneumonia—1 Death:*

F. S. 5/12/24. Para iv. At term. Toxemia of pregnancy and chronic cardiac disease. Spontaneous delivery. Transferred to medical ward on seventh day postpartum and died there of pneumonia.

*Chronic Pulmonary Tuberculosis—1 Death:*

A. R. 1/28/25. Para viii. Thirty-two weeks pregnant. Precipitate delivery four hours after admission. Transfusion. Died on eleventh day postpartum. Chronic pulmonary tuberculosis; secondary anemia; tubercular kidneys; uremia.

*Tuberculous Meningitis—2 Deaths.*

R. L. 2/28/22. Para i. Three months pregnant. Transferred from medical ward with acute vomiting of pregnancy. Seven days later diagnosis made of tuberculous meningitis, and patient was transferred back to medical ward. Died the next day. Autopsy: tubercular kidneys and ureter; tuberculous meningitis.

G. S. 5/16/22. Para v. At term. Induction by bag. Spontaneous delivery. No anesthesia. Death on third day postpartum. General miliary tuberculosis with meningeal involvement.

*Meningococcus Meningitis—1 Death:*

C. B. 2/22/25. Para vi. At term. History of otitis media for past three weeks. Comatose on admission. Had 6 convulsions. Died same day. Postmortem delivery of stillborn child.

*Chronic Cardiac Disease—1 Death:*

C. K. 3/6/26. Para iii. Twenty-eight weeks pregnant. Admitted with decompensation and acute bronchitis. Pulmonary edema developed two days later. Spontaneous abortion on fourth day. Death ten and one-half hours postpartum. Mitral stenosis and insufficiency.

*Status Epilepticus—1 Death:*

L. N. 3/29/22. Para iii. History of frequent epileptic seizures. Had 14 convulsions. Death sixteen hours after admission, undelivered.

## MATERNAL MORTALITY—OBSTETRIC

*Septicemia.*—Eight patients died of sepsis. Three of these women were delivered spontaneously under our care and *without vaginal or rectal examinations* during labor. Another was admitted after thirty-nine hours of labor, with a history of one rectal examination by a private physician. She delivered spontaneously without further rectal or vaginal examination. One patient was delivered by breech extraction on the outdoor service and was transferred to the gynecologic ward on the fourth day and died there of sepsis. Manual removal of the placenta was necessary in two cases. One of these patients was delivered at home by a private physician who removed the placenta manually; the other was delivered at home by an ambulance surgeon and was admitted to the hospital with a retained placenta which was extracted manually because of bleeding. Another patient was admitted after an unsuccessful attempt at forceps delivery by a private physician and was delivered by us with high forceps.

At the beginning of 1922 we conducted a study<sup>1</sup> of the effects and curative value of polyvalent antistreptococcic serum. It was unfortunate that we were unable to obtain positive blood cultures from these patients who were apparently suffering from a streptococcic infection, as one-half of them had positive cultures from the body of the uterus. In the fourteen cases clinically diagnosed as streptococcemia, there was a mortality of but 15.3 per cent. While the lack of positive blood cultures may fail to convince others of the value of the serum, we are satisfied by the prompt subsidence of the temperature and other symptoms that it is in some instances life-saving and is harmless when properly administered.

Following the reports by Drs. Gellhorn and Rawls, demonstrating the value in gynecologic infections of intramuscular injections of boiled milk, we have used this foreign protein in all cases of postpartum infection which were apparently caused by the staphylococcus, colon bacillus, or saprophytic organisms. These patients all had the symptoms of fever, free foul lochia, parametric tenderness, and exudate. We also used the milk injections in patients showing signs of pyelitis. There is no danger from the injections, provided the patient is tested for the protein and, frequently, after two or three doses the fever and symptoms subside.

*Eclampsia.*—The largest number of deaths occurred from eclampsia and toxemia of pregnancy. Six of the eight eclamptic deaths were in 1922. Labor was induced by bag in three of the patients. Five of the patients were brought to the hospital after convulsions at home. None of them had reached the eighth month of pregnancy.

TABLE II. ECLAMPSIA IN 4396 INDOOR DELIVERIES, 1922-1926

	1922				1923-1926			
	CONSERVATIVE TREATMENT				MODIFIED STROGANOFF TREATMENT			
	NO. OF CASES	MATERNAL DEATHS	INFANT DEATHS	METHOD OF DELIVERY	NO. OF CASES	MATERNAL DEATHS	INFANT DEATHS	METHOD OF DELIVERY
Antepartum	11	4	6	Bag Forceps Undel'd	18	2	11	Spontan. Bag after recovery Forceps
Intrapartum	0	0	0		4	0	2	
Postpartum	4	2	2		6	0	1	
	15	6 (40%)	8		28	2 (7.1%)	14	

Total Cases 1922-1926, 43.

Maternal Mortality, 18.6%.

After 1922 we followed the Stroganoff régime for the treatment of eclampsia, varying it only by the elimination of the last two doses of chloral. In Table II great improvement is shown in the results. The patient who died in 1925 was admitted in coma and died eighteen hours later. The 1926 death was undoubtedly one of uremia, but we have included it under the eclamptic deaths because in the last revision of the International Code, puerperal uremia was placed under the diagnostic heading of Puerperal Albuminuria and Convulsions. This patient had had thirteen pregnancies with a history of chronic nephritis in all.

Of the patients who recovered, two were undelivered, and in both instances the child was alive. In these women labor was induced, one a few days after recovery from the convulsions, the other two weeks later.

There were two maternal deaths, or an incidence of 7.1 per cent, in the 28 cases during the last four years. This remarkable drop in the death rate from over 30 to 7 per cent leads to the conclusion that the Stroganoff treatment is preferable to the method formerly employed, that is, induction by bag.

*Toxemia of Early Pregnancy.*—There were 21 cases of pernicious vomiting. One patient had a spontaneous abortion; there were four therapeutic abortions, and 16 patients were cured by dietetic control. One progressed to a condition that we considered as acute yellow atrophy, and her death is recorded under this diagnosis. At the time of death she was eight weeks pregnant, dehydrated and jaundiced, and had been under treatment for two weeks by hypodermoclysis, glucose by rectum, and feeding through a duodenal tube. Finally, with a  $\text{CO}_2$  combining power of 26 per cent, it was felt that the uterus could be safely emptied without the use of anesthesia. The jaundice deepened, and she died the same day. This death occurred in 1922, and at that time we were not giving sugar by vein. There were five other cases of the acute yellow atrophy type of toxemia; two died and three recovered. The patients who died were in the sixth or seventh month of pregnancy. One was admitted after three weeks of vomiting and was acutely ill, but her temperature was  $99.4^\circ \text{F}$ . Fifty grams of sugar in 10 per cent solution were given by vein; this was followed by a chill and a rise of temperature to  $107.4^\circ$ , with delirium. She died three and a half hours after receiving the glucose. This death occurred in 1923, and there is no doubt that the glucose was given too rapidly. The other patient had been vomiting at home for five days and was admitted in labor. She delivered spontaneously a 1700 gram baby. The patient was dyspneic and in very poor condition and died on the third day postpartum.

The first of the three patients who recovered was three months pregnant and had been operated upon for appendicitis. When the

vomiting continued and jaundice appeared, it was realized that there was a liver disturbance. On the second day postoperative she was transferred to us and given hypodermoclysis and sugar by vein. This was repeated on the following day, and the  $\text{CO}_2$  rose to 64 per cent, although there was still a considerable amount of acetone in the urine. Three days later she aborted spontaneously. Her condition improved steadily, although the urine contained much bile. The second patient had black vomit for five days. Labor was induced by bag and she delivered a 2250 gram stillborn child. Hypodermoclysis was given and also fifty grams of sugar by vein. The vomiting ceased after the delivery. On admission the N.P.N. was 63;  $\text{CO}_2$ , 30. Nine days later the N.P.N. was 24;  $\text{CO}_2$ , 58. In the third case the patient had had black vomiting and tenderness over the liver for two days, and had been suffering from marked obstipation. Labor was induced by a bag, and she delivered a 2600 gram living baby. This patient also was given saline solution by hypodermoclysis but no sugar. Recovery promptly followed delivery.

*Chronic Nephritis.*—There were 36 cases of chronic nephritis that required treatment for the condition. Labor was induced in eight cases by bagging and in two by rupture of the membranes. One patient was delivered by vaginal hysterotomy. The remaining 25 went into labor spontaneously after the administration of castor oil and quinine. Twenty-seven of these patients had a systolic blood pressure ranging over 150 and nine over 200. In all instances the albumin in the urine was from 2- to 4-plus. One woman who had had a prolonged labor died just after the anesthesia was started for a forceps delivery. Sixteen of the 36 babies died; 8 were abortions, and 5 were macerated fetuses.

*Preeclampsia.*—There were 87 cases of preeclampsia. All of them had albuminuria, and most of them had a rise in blood pressure. Labor occurred spontaneously in 63 cases. Twenty-one of the 63 babies were stillborn or died shortly after birth; 6 were macerated fetuses, and 7 were abortions.

Labor was induced in 15 cases. Six of the babies were dead at birth—2 were abortions and 4 were macerated. Nine of the women went into labor spontaneously but were delivered by operative procedures. In this group one baby was stillborn. The total infant death rate of preeclamptic mothers was, then, including abortions and macerated fetuses, 32 per cent, but it should be noted that many of the babies were premature.

In addition to the 87 cases of preeclampsia there were 30 cases of toxemia of pregnancy accompanying premature separation of the placenta. These have been considered under the latter heading and are not included here.



*Placenta Previa.*—We had 58 cases of placenta previa—26 central, 11 partial, and 21 marginal—with four maternal deaths or a rate of 6.9 per cent. One of these women, however, had erysipelas before delivery. Twenty-eight of the babies died, and of these 6 were abortions, giving an infant death rate of 48.2 per cent.

Twenty-nine of the patients were induced by the extraovular insertion of a Voorhees bag, and we believe that our good results are largely due to the fact that the routine treatment requires the operator who inserts the bag to remain with the patient until she is delivered and out of shock. Four spontaneous deliveries, 1 forceps delivery, and 24 breech extractions followed the bagging. Four women were delivered by abdominal cesarean section and 2, in early pregnancy, by vaginal hysterotomy. One of the patients who had an abdominal cesarean section operation died; this was the only death from cesarean section during the five years.

TABLE III. PLACENTA PREVIA IN 4396 DELIVERIES, 1922-1926

METHOD OF DELIVERY	NUMBER OF CASES	MATERNAL DEATHS	INFANT DEATHS	REMARKS
Cesarean	6	1	4	2 vaginal hysterotomies, 5½ months
Bag	29	2	10	22 versions & extractions 2 breech extractions 1 forceps. 4 spontaneous
Version & Extraction	10	1	5	9 4-fingers dilated on admission
Ruptured Membranes	4	0	3	1 Braxton-Hicks All marginal
Forceps	2	0	2	Dilated on admission
Spontaneous	7	0	2	All marginal. Moderate bleeding
	58	4*	28†	*1 case of erysipelas antepartum †6 were abortions
Maternal Mortality 6.9%		Central placenta previa 26		
Infant Mortality 48.2%		Partial placenta previa 11		
		Marginal placenta previa 21		

The great difficulty with abdominal section in placenta previa lies in the fact that the majority of serious cases, that is, the central and partial types, are likely to be more or less exsanguinated on admission, and operative procedure so increases the prostration and shock that recovery is problematical. The one cesarean death in our series was from uterine sepsis, a complication that is always to be anticipated in patients who are brought in after they have been examined through an unprepared vulva. Eleven, or one-half, of the women with marginal placenta previa were delivered spontaneously, following rupture of the membranes.

We instituted no operative procedure in the hemorrhage cases while shock existed, contenting ourselves with the treatment of this condition and the prevention of further blood loss. In every case of par-

tial or complete placenta previa, the uterus was packed following delivery. Two of the four deaths were due to postpartum hemorrhage that occurred behind the packing.

*Premature Separation of the Placenta.*—There were 67 cases of premature separation of the placenta, 35 occurring before the eighth month of gestation. In all, four women died, a mortality of 5.9 per cent. Two of the patients who died lapsed into shock immediately following delivery which was spontaneous in one instance and by version in the other. It has seemed to us that the shock might have been due to splanchnic dilatation due to lowered intraabdominal pressure, because in one case there was an immediate drop in blood pressure from 220 to a point at which it could not be ascertained. Another woman was admitted in shock; she improved following a transfusion but died on the eighth day of an embolus. The fourth woman died from trauma during delivery by high forceps. The autopsy showed a small tear in the lower uterine segment but no involvement of the large vessels.

There were 43 infant deaths including 15 abortions, giving a mortality of 64 per cent.

TABLE IV. PREMATURE SEPARATION OF THE PLACENTA IN 4396 INDOOR DELIVERIES, 1922-1926

AMOUNT OF HEMORRHAGE	NO. OF CASES	TOXEMIA	PACKING	SHOCK	MATERNAL DEATHS	INFANT DEATHS	REMARKS
Severe 2000 e.c.	22	9	10	14	4	21	Bag, 10 Membranes ruptured, 5 Version, 3 Cesarean, 1 Spontaneous, 3
Moderate 1500 e.c.	16	7	1	0	0	10	Bag, 3 Forceps, 1 Cesarean, 1 Memb. rupt. & version, 2 Memb. rupt. & spont., 1 Spontaneous, 8
Slight 1000 e.c.	29	13	0	0	0	12	Bag, 3 Forceps, 1 Memb. rupt., 3 Spontaneous, 22
	67	29	11	14	4	43*	*15 were abortions

Maternal Mortality, 5.9%; Infant Mortality, 64%.

We have divided the cases of premature separation of the placenta into three groups according to the amount of hemorrhage—the serious, with hemorrhage estimated as more than 1500 e.c.; the moderate, with hemorrhage of from 1000 to 1500 e.c.; the slight, with hemorrhage of approximately 1000 e.c. Any bleeding estimated as less than

1000 c.c. was not considered as a hemorrhage. All of the maternal deaths and half of the infant deaths were in the severe group, giving for this type of hemorrhage a maternal mortality of 18.1 per cent and an infant mortality of 95.4 per cent. As indicative of the extent of the bleeding, it is interesting to note that 14 of the 22 serious cases went into shock. Five of them, in addition to hypodermoclysis, etc., were given a transfusion. There were 16 cases of moderate hemorrhage, with no maternal or infant deaths. None of these patients showed symptoms of shock before delivery. In the 29 cases with slight bleeding there were no instances of shock and no maternal deaths. Twelve, or 41 per cent, of the babies died.

Thirty-three or about one-half of the patients delivered spontaneously. Toxemia, as evidenced by a rise in blood pressure and albumin in the urine, was noted in 29. As we were observing particularly the incidence of toxemia, we were careful to have definite signs before we credited the premature separation of the placenta with this complication or origin.

Patients who, on admission, are noninfected and have a dilated or dilatable cervix should be delivered from below, unless the blood pressure is 200 or over. In this case it is better to do a cesarean section because of the high incidence of shock that follows the lowering in intraabdominal pressure after rapid delivery from below. When, however, the delivery occurs through the natural channels, a Beck binder should be tightened as the child is extruded or a sand-bag should be placed on the abdomen.

*Postpartum Bleeding.*—There were 66 cases of postpartum hemorrhage which we have divided into two groups, those with serious and those with moderate hemorrhage.

Each of the groups has been subdivided according to whether the hemorrhage occurred before or after the removal of the placenta. It was necessary to pack the uterus in 25 of the 66 cases. The packing—iodoform gauze—was inserted through a tube packer and removed within twenty-four hours. Sixteen of the patients were delivered by operative procedures. The placenta was manually removed in 29 cases. Twenty-four of the patients developed shock.

Five, or 7.5 per cent, of the mothers died. Two patients in whom the placenta had been removed manually died of sepsis. A third patient died of cerebral embolus. A fourth was admitted in a dying condition and died in fifteen minutes. The fifth died on the tenth day, of bronchopneumonia. She had been delivered spontaneously and had had only a moderate hemorrhage. We have listed this case here because we felt that the pneumonia was caused by numerous small emboli that formed immediately after the hemorrhage.

*Shock.*—As death follows the advent of shock in many hemorrhage cases, we made a study<sup>2</sup> of the action of gum glucose in obstetric

TABLE V. 66 CASES OF POSTPARTUM HEMORRHAGE IN 4396 DELIVERIES, 1922-1926

	SEVERE HEMORRHAGE								MODERATE HEMORRHAGE									
	DELIVERY				PLACENTA				DELIVERY				PLACENTA					
	NO. OF CASES	SPONT.	OPERAT.	AT HOME	MAN. REM.	CREDE	PACKING	SHOCK	MAT. DEATHS	NO. OF CASES	SPONT.	OPERAT.	AT HOME	MAN. REM.	CREDE	PACKING	SHOCK	MAT. DEATHS
Intrapartum*	21	9	5	7	15	5	11	8	2	18	13	2	3	13	5	3	4	1
Postpartum	17	5	6	6	1	14	10	11	1	10	7	3	0	0	10	1	1	1
	38	14	11	13	16	19	21	19	3	28	20	5	3	13	15	4	5	2

\*After delivery of baby and before delivery of placenta. Maternal Mortality, 7.5%.

shock. This followed the demonstration by Dr. Lillian K. P. Farrar of the value of gum glucose as a prophylactic against shock in gynecologic operations.

We have a group of professional donors for transfusion purposes, but because of the time that must elapse, especially at night, before a donor can be secured, we use gum glucose infusions as a temporary substitute for transfusion. In a number of cases the patient was brought out of shock by this method, and the blood pressure raised to a point where operation was possible. We believe that provided gum glucose is given slowly enough, that is, not faster than 4 c.c. per minute and at a temperature of 104 degrees, it is harmless and of great value in raising the blood pressure. When there has been hemorrhage, transfusion should follow.

*Rupture of the Uterus.*—We had one death from rupture of the uterus. The patient was delivered on the outdoor service by version following an attempt at forceps delivery. We do not believe in delivery by version following an unsuccessful attempt by forceps, as it is the common cause of rupture of the uterus. The patient was transferred to the hospital and given gum glucose by vein and a transfusion. After the blood pressure had risen to a point over 100, a hysterectomy was performed. Death occurred on the third day.

Another patient who had a spontaneous rupture of the uterus recovered after hysterectomy.

A third patient, with a tear of the lower uterine segment that occurred during an operative delivery, has been listed under her original condition, accidental hemorrhage.

#### MATERNAL MORTALITY—MEDICAL

*Medical Complications.*—The cases with medical complications explain themselves. The large number of patients who died of antepartum pneumonia had the grippe-pneumonia type of the disease, common during the winter months, and in every instance the patients were admitted with evidences of lung involvement. Through consultations, the treatment of these patients was conducted under the supervision of our medical service.

#### INFANT MORTALITY

*Mortality on the Indoor Service.*—We have divided the infant deaths into two groups: first, viable infants 1500 grams and over in weight, and second, those under 1500 grams, which we consider abortions and nonviable. There may be instances when the child under 1500 grams is viable and will live even to adult life, but they are very few. In the 4396 indoor deliveries there were 137 abortions and 315 premature babies, that is, babies between 1500 and 2500 grams. In this latter group there were 85 stillbirths and neonatal deaths, a rate of 27.3 per



TABLE VI. INFANT DEATHS IN 4396 INDOOR DELIVERIES, 1922-1926

CAUSE	INFANT DEATHS		CAUSE	ABORTIONS UNDER 1500 GRAMS
	STILLBIRTHS	NEONATAL		
Cesarean	4	3	Antepartum Bleeding	25
Forceps	30	8	Syphilis	19
Version & Extraction	24	3	Toxemia	36
Craniotomy	7	0	Tuberculosis	3
Antepartum Bleeding	24	12	Acute Infection of Mother	5
Difficult Labor	7	3	Unknown	49
Prolapsed Part	9	2		
Monstrosity	6	3		
Toxemia	29	12		
Syphilis	13	5		
Spontaneous Delivery				
Miscellaneous	33	25		
	195	74		137
	(Mac. 57)			(Mac. 47)

Stillbirths and neonatal deaths including abortions: 406 - 9.2%

Stillbirths and neonatal deaths without abortions: 269 - 6.1%

Stillbirths and neonatal deaths without abortions and macerated: 212 - 4.8%

cent. This high rate, of course, markedly affects our general rate and is due largely to the deaths of infants whose mothers had toxemia, placenta previa, and accidental hemorrhage.

Toxemia stands foremost as the cause of stillbirths and, including abortions, accounts for 19 per cent of the deaths. Antepartum bleeding stands second with a rate of 15 per cent. Forceps and version deliveries stand third. There were 9 monstrosities.

Thirty-seven, or 9.1 per cent, of the deaths were attributed to syphilis as the primary cause, but the total death rate of children of syphilitic mothers was 13 per cent.

In the 406 deaths, 104, or about 25 per cent, were macerated fetuses. This point is important, as most of the mothers in these cases had had no prenatal care. If we deduct the macerated fetuses and abortions, in other words include in the death rate only those infants for whom we might be considered responsible, the death rate is 4.8 per cent. The total death rate, including all stillbirths and neonatal deaths is 9.2 per cent.

*Mortality on the Outdoor Service.*—The infant death rate on this service is very low, but this was to be expected as the mothers were all normal multiparae. There were 23 stillbirths 10 of which were macerated, and 11 neonatal deaths 2 of which were abortions—a total loss of 34 infants or 3 per cent.

#### MATERNAL MORBIDITY

*Morbidity on the Indoor Service.*—Patients with temperature of 100.4° for two consecutive days (excluding the first day) during the postpartum period have been included in this group. We have found the morbidity rate slightly higher than was expected in view of the fact that 58 per cent of the indoor deliveries were conducted without

TABLE VII. ANALYSIS OF MORBIDITY IN 4348\* INDOOR DELIVERIES, 1922-1926

YEAR	OBSTETRIC MORBIDITY			MEDICAL AND OTHER MORBIDITY				
	NO VAGINAL OR RECTAL EXAM. 2562 CASES	VAGINAL EXAM. 952 CASES	OPERATIVE 735 CASES	MASTITIS	PYELITIS	RESPIRATORY DISEASES	TUBERCULOSIS	MISC.
1922	52	13	38	5	1	6	4	7
1923	21	5	32	6	2	6	2	1
1924	40	31	38	1	9	20	1	1
1925	29	8	20	2	3	2	2	4
1926	45	9	32	3	1	4	4	2
	187	63	160	17	16	38	13	15

\*No fatal cases in this group.

\*No fatal cases in this group. Mortality considered separately. 3.9%.  
Total Uterine Morbidity. 9.6%; Uterine Morbidity over 3 days, 3.9%.

vaginal or rectal examinations. We have divided the cases with morbidity into two groups—those with temperature due to uterine infection and those with temperature due to medical or surgical causes. The total uterine or obstetric morbidity was 9.6 per cent.

Comparison of the temperature in patients who were examined vaginally or rectally with those who were not show that in the former group the rate was 6.6 per cent and in the latter 7.2 per cent—a difference of 0.6 per cent. The slightly lower rate in the cases that were examined is explained by the fact that during the past year we have been using vaginal injections of 2 per cent mercurochrome as a routine procedure before examination. Vaginal injections of 2 per cent mercurochrome have also been made in all operative cases. We have used mercurochrome injections more and more frequently since Mayes' report before this Society in 1925. There was a morbidity rate of 21.7 per cent in the operative cases.

Of the 410 cases with obstetric morbidity, 44, or 1 per cent, of the 4396 indoor deliveries, had a temperature for ten days or more. Fourteen of the 44 were in the operative group. Special mention must be made of one patient who lost both legs—one, half way to the knee and the other at the ankle. This woman, a primipara, was delivered by low forceps, as the head had been on the perineum for some time. Her temperature gradually rose to 103° on the seventh day, and at this time she complained of cold and numbness in both feet. She was transferred to the surgical service, and three days later there was a well-recognized demarcation line of the right foot and left leg up to a point just above the ankle. The left leg was amputated six days after the first signs of thrombosis were discovered and the right foot on the nineteenth day. The patient had a stormy convalescence but finally recovered.

In the group of cases with morbidity attributable to nonobstetric causes, there were 17 cases of mastitis. Most of these did not have abscess formation; the temperature subsided after compression or the application of an ice-bag. There were 16 cases of pyelitis with a temperature for two days or more. In addition, there was active pyelitis in one woman who died of sepsis and in another who died of pneumonia. In the latter case there was a positive blood culture of staphylococcus before delivery. Five patients with pyelitis showed no rise in temperature, and sixteen were discharged antepartum or admitted postpartum and therefore are not recorded in the table.

*Morbidity on the Outdoor Service.*—Twenty-three of the 1124 outdoor patients had morbidity in the postpartum period. Any of the outdoor cases that showed marked abnormality were transferred by ambulance to the hospital, and therefore there was very little operative procedure.

## INFANT MORBIDITY

In 1922 we had an epidemic of contagious impetigo. Notwithstanding changes in the wards and nurses and especial care on the part of the staff, we had 224 cases in six months. Only the first three babies died, and these infants had exfoliative dermatitis with loss of skin over large areas. The disease became steadily less severe but persisted for several months. A special study of this infection was made by one of the staff.<sup>3</sup>

We had, during the five years, no severe infections of the umbilical cord. As soon as the cord is cut, it is wiped with tincture of iodine, and a dry sterile dressing is applied.

We treated the infants who showed any symptoms of head injuries with subcutaneous injections of maternal blood and kept them quiet, not allowing them to be moved even for nursing.

The babies who required additional feedings were given the Holt-Howland formula, known as 5 and 20. Very premature infants were fed breast milk from foster mothers and kept in incubators.

One of our staff, Dr. Gravelle,<sup>4</sup> modified an open incubator box that we had used for fifteen years by constructing a double wall with an electrical appliance that automatically keeps the temperature at 100° F. The infant lies with its head outside the box.

## THE CONDUCT OF NORMAL LABOR

We discarded the vaginal examinations in 1921 because of the increase in sepsis that occurred, not only in our hospital but in hospitals throughout the country. We believe that the rectal examination is quite as likely as the vaginal to carry infection to the upper part of the vaginal tract, and therefore, since 1922 we have conducted normal labors with the abdominal examination alone. We wish to confirm the demonstrations of the German clinics where it was shown that a surprising amount of information can be obtained from an abdominal examination. After a few months' practice with this technique, as much information can be acquired as with the vaginal or rectal examination. Even the amount of dilatation may sometimes be ascertained by abdominal examination. We have used this method of conducting labor conservatively, and if the uterine contractions are prolonged over twelve hours without advance of the head or if there is evidence of trouble not fully recognized by abdominal palpation or if the woman is corpulent and the information acquired is not adequate, we make the additional vaginal examination. We regularly check our abdominal findings by observing the restitution and rotation of the head as it is born through the vulva, and we have found that there is about 80 per cent of accuracy even in the examinations of the junior internes.

In making the abdominal examination we try first to map out the fetal back. We then determine in the head positions the side to which the occiput presents. We palpate the upper and the lower poles of the fetus by deep lateral palpation of the abdomen. This almost invariably determines the extent of flexion of the presenting head. Brow and face presentations may be ascertained in a like manner. The amount of engagement may be accurately learned by the Pawlik grip by which, with the thumb on one side and the four fingers on the other, the fetal head may be grasped through the abdominal wall. As labor advances, the dilatation can be determined by the rise of the contraction ring. When this ring is four-fingers' breadth above the symphysis, the cervix will be found to be almost fully dilated. As a rule, further definition cannot be obtained by this examination. When operative delivery becomes necessary, it can be performed on a clean case or at least on one that has not been infected by the attendants.

During the five years we have conducted 58 per cent of the labors on the indoor service in this way and in the last year, 72 per cent. On the outdoor service, last year, 195 labors were conducted with 52 vaginal examinations. The chief difficulty that we have to overcome is the objection on the part of the internes and students to the substitution of the abdominal for the vaginal examination. They feel that part of their training is being withheld, and therefore each new staff must be convinced through observation and experience.

#### OPERATIVE PROCEDURES

*Cesarean Section.*—We have had 93 cesarean sections in the five years. Sixty-six were of the low cervical type; 19 of them were elective because of previous section, and 47 patients had labors that averaged twenty-three hours. In most instances these patients were admitted after some hours of labor at home, and many of them had had vaginal examinations so that the morbidity was high, but there were no maternal deaths.

There were two vaginal hysterotomies for placenta previa in the fifth month and one for chronic nephritis.

It will be noted that there were 21 operations where the incision was low, but the bladder was not retracted. This operation was done

TABLE VIII. CESAREAN SECTIONS IN 4396 INDOOR DELIVERIES, 1922-1926

	NUMBER OF CASES	PRIMARY UNION	STITCH ABSCESS	WOUND INFECTION	MORBIDITY	MATERNAL DEATHS	INFANT DEATHS
Low Flap*	66	49	12	5	34	0	4
Low Uterine	21	18	1	1	1	1	5
Mid Uterine	3	2	1	0	1	0	0
Vaginal Hysterot- omy	3	3	0	0	0	0	3
	93	72	14	6	36	1	12

\*47 low flap with average labor of 23 hours.

Maternal Mortality 1.07%.  
Gross Infant Mortality 12.9%.  
Net Infant Mortality 8.6%.

TABLE IX. 419 CASES OF CONTRACTED PELVES IN 4396 INDOOR DELIVERIES, 1922-1926

	TOTAL NUMBER OF CASES	SPONT. DELIVERIES		OPERATIVE DELIVERIES						INFANT DEATHS
		NUMBER	INFANT DEATHS	TOTAL	CESAREANS	FORCEPS	VERSIONS	CRANIOTOMIES		
Generally Contracted	* 173	115	5	58	31	22	3	2	8	
Flat	210	134	3	76	30	39*	6	1	7	
Funnel	33	19	1	14	4	9	1	0	1	
Irregular	3	0	0	3	2	1	0	0	1	
	419	268	9	151	67	71	10	3	17	

\*1 maternal death from sepsis.



rather than the low cervical because of previous sections or overhanging and corpulent abdomens. The only death that occurred from cesarean section was that of a patient with placenta previa who was delivered with a low uterine section.

*Pelvic Contraction.*—We felt that the apparent safety with which the low cervical cesarean section can be done late in labor justified trial labor in the treatment of patients with relatively contracted pelves. There were 419 cases of pelvic contraction. Two hundred and sixty-eight delivered spontaneously after trial labors; 151, or 37 per cent, were delivered by operative procedures, 67 of which were cesarean sections.

The only patient in the series who died was delivered by a median forceps operation. Death was caused by septic thrombus of the brain. There were 26 infant deaths or, deducting 4 deaths due to maceration, 2 to hydrocephalus, and 1 to erysipelas, a net loss of 19, or 4.5 per cent. A report<sup>5</sup> of our cases of pelvic contraction has already been published.

TABLE X. FORCEPS DELIVERIES IN 4396 INDOOR DELIVERIES, 1922-1926

	NO. OF CASES	INFANT DEATHS	MATERNAL DEATHS	REMARKS ON MATERNAL MORTALITY
High Forceps	71	23	4	1 premature separation of placenta 1 sepsis 1 chronic nephritis & cardiac disease 1 pulmonary embolus
Mid Forceps	180	17	2	1 antepartum pneumonia 1 antepartum pyelitis & sepsis
Low Forceps	179	13	2	1 antepartum pneumonia 1 antepartum pneumonia & pyelitis
	430	53 (6 mac.)	8	

Net Infant Mortality, 10.9%.

*Forceps Deliveries.*—The number of our forceps deliveries—430—seems large, but in many of the cases the forceps procedure consisted merely in lifting the head over the perineum, the so-called forceps control, a procedure that we believe to be a conservative operation.

One hundred and forty-four of the forceps deliveries were necessitated by occiput posterior positions. Forty-one of these were high forceps operations performed after an average of thirty-five hours of labor with engagement of the fetal head. One mother who, before admission, had had prolonged attempts at forceps delivery by a private physician, died of sepsis. Eight babies died. There were 67 mid-forceps deliveries after an average of twenty-four hours of labor. Three of these infants died. Thirty-six patients were delivered by low forceps, with 4 infant deaths. The total stillbirth and neonatal death rate in the occiput posterior cases was 10 per cent. The Williamson<sup>6</sup> operation, that is, the application of the forceps to the head in a transverse position, is the one that we regularly use. There

is no danger in this procedure provided the cervix is retracted over the head and no traction is made until after rotation occurs as the forceps is locked.

In the 430 forceps deliveries one woman died from sepsis and one from embolus. There were 6 other maternal deaths from complicating conditions for which the forceps procedure was done: one from cardiac disease, 3 from antepartum pneumonia, and one from premature separation of the placenta. A total of 53 infants died. Six were macerated fetuses, and deducting these, the infant mortality rate was 10.9 per cent. The obstetric morbidity was 16.6 per cent.

*Breech Extraction.*—Breech extraction was performed in 227 cases of spontaneous breech presentation. One of the patients died of eclampsia and one of antepartum pneumonia. There were 71 stillbirths and neonatal deaths or, deducting 18 macerated fetuses and 18 abortions, a net total of 35 deaths, or 15.4 per cent.

TABLE XI. BREECH DELIVERIES IN 4396 INDOOR DELIVERIES, 1922-1926

METHOD OF DELIVERY	NUMBER OF CASES	INFANT DEATHS	MATERNAL DEATHS	REMARKS
Breech Extraction	227	71 (18 mac.) (18 abor.)	2	1 eclampsia 1 antepartum meningitis
Version & Extraction	77	33 (2 mac.) (1 abor.)	3	1 antepartum pneumonia 2 placenta previa

Breech Extraction—net infant mortality, 15.4%; Version—net infant mortality, 38.9%.

Indication for versions: Placenta previa, 30; Prolapsed part, 20; Transverse, 4; Premature separation placenta, 5.

*Version and Breech Extraction.*—Seventy-seven patients were delivered by version and breech extraction. Thirty of these operations were done for placenta previa, 20 for prolapsed parts, 4 for transverse positions, and 5 for accidental hemorrhage.

There were three maternal deaths, two from placenta previa and one from antepartum meningitis. There were 33 infant deaths, including 2 macerated fetuses and 1 abortion; deducting these, the net infant death rate was 38.9 per cent. While the infant mortality seems high, it may be noted that the majority of the babies were premature.

In all cases of placenta previa, external version to bring down the breech was attempted before the administration of anesthesia; if not successful it was done after the anesthesia was complete. This procedure is very easy in patients with complete placenta previa, because the presenting part is not in the pelvis.

*Induction.*—Labor was induced in 103 cases (excluding 4 therapeutic abortions), in 85 by bag, in 8 by rupture of the membranes, in 9 by partial manual dilatation, and in 1 by bougie. The infant mortality in the cases that were induced by bag was 50 per cent. This high rate is due to the complications for which the induction was

done: in 32 cases of toxemia, eclampsia, and chronic nephritis there were 18 infant deaths, and in 45 bleeding cases there were 21 infant deaths.

The number of cases induced by rupture of the membranes, manual dilatation, or bougie are too few to be used for purposes of comparison. In all instances the indication was some form of toxemia or of bleeding. Thirteen infants died, making the total infant death rate in the 103 induced cases 54 per cent, a fact that leads to the conclusion—and correctly—that the inductions were done for the benefit of the mother.

*Episiotomy.*—There were 68 lateral episiotomies. The majority were done before breech extraction or with forceps operations.

*Third Degree Lacerations.*—Third degree lacerations occurred in 8 cases. Three other patients who had been delivered at home by private physicians were admitted with this injury. Primary repairs were made in all cases.

*Craniotomy.*—Craniotomy was performed in 13 cases. Nine of the babies were known to be dead before the operation. The remaining 4 babies had been so traumatized by prolonged labor and operative attempts at delivery that death was imminent, and the birth of a living baby impossible. No mothers died.

*Cardiac Disease.*—Forty-nine patients had cardiac disease with decompensation. There were 4 maternal deaths. One of them, a patient with advanced chronic nephritis, has been recorded as an anesthetic death. One died after a spontaneous abortion at the twenty-eighth week, and two died of pneumonia, one antepartum and one postpartum.

Thirty-six of the patients were delivered spontaneously, 8 by forceps, 3 by induction by bag and 2 by cesarean section. There were 12 stillbirths and neonatal deaths, including 2 macerated fetuses and 2 abortions.

Our method of treatment consisted in restoring the compensation and refraining from induction or operative delivery while decompensation existed. If anesthesia was necessary, we used gas and oxygen, 3 parts to 1.

*Tuberculosis.*—Twenty-two of the women had tuberculosis. Two died—one undelivered—with tuberculous meningitis. There were 4 infant deaths, 2 being abortions and 1 macerated. Seventeen of the deliveries were spontaneous.

*Syphilis.*—There were 139 cases of syphilis, accepting 3- and 4-plus Wassermann reactions as an indication of the disease. Fifty-four of the infants died; 32 were macerated fetuses and 6 were abortions.

*Prolapsed Parts.*—Prolapse of the cord occurred in 39 cases and in 10 of these there was also prolapse of the arm. Twenty babies, including one set of twins, died; 11 were dead before delivery, and 3 were abortions.

There were 14 cases of prolapse of an arm, with 11 infant deaths. Six of the babies were dead before delivery, 3 of them being macerated.

Four of the babies with prolapsed cord were delivered spontaneously. All the other deliveries were operative, the majority being breech extraction or version and breech extraction. In the babies with prolapse of the arm, version was performed very slowly under deep anesthesia after the prolapsed arm had been painted with iodine and reinserted. We have never found it necessary to do a decapitation in cases of transverse presentation. An exceedingly slow version, that is, with the operator's arm moving at the rate of a millimeter a minute or merely holding the baby's leg without traction, draws the infant around in the relaxed uterus.

In the 53 cases of prolapsed parts, 31 babies died. Twenty of them were dead before the admission of the mother.

#### CONCLUSIONS

It may be stated as a fact that, within my experience, an obstetric service can be conducted with far less morbidity in a hospital maintained for the care of maternity patients only than in a general hospital. In order to keep the mortality rate on a general service as low as on a private service, it is necessary to adopt unusual precautions against infections. We feel that our success during the five years here recorded is due chiefly to the limitation of vaginal and rectal examinations and to the conservative use of operative procedures. In order that the service should be closely controlled, the staff had monthly meetings at which routine procedures for the operative work were discussed and adopted, with the understanding that any member of the staff, either resident or visiting, might vary the routine for the needs of any individual case. Any variations, however, had to be reported at the regular meetings. These standard procedures were accepted gratefully by the resident staff and also by the nurses, who were thus enabled to prepare in advance for operations. Adherence to routine procedures has provided us with statistical studies that are valuable for comparison.

I wish to express my thanks and gratitude to the members of the staff, Drs. Williamson, Gravelle, McCandlish, Conkey, and Driscoll for their prompt response to the demands of the service.

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## THE CLINICAL USE OF OVARIAN FOLLICULAR HORMONE WITH SPECIAL REFERENCE TO FUNCTIONAL STERILITY\*

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ANY procedure that can be of value in treating sterility is justified after reading Dickinson's and Cary's<sup>1</sup> analysis of observations on 12,000 sterile unions, which is anything but encouraging. With a normal husband, a woman married for two years without conception, has a maximum general expectation of one chance in three to conceive as a result of expert medical advice. If she has closed tubes, the chance is one to seven by operation; if infantile uterus, one to four. In the review mentioned above, the main causes of sterility are given as obesity; underdevelopment; anteflexion and habitual amenorrhea; salpingitis; appendicitis, and closed tubes; and male causes.

In looking for other causes one must not forget the patient's general condition, hyperacidity of the vaginal secretion, and incompatibility. Formerly, much emphasis was placed on insufficient calcium in the mother, but according to a recent report by Macomber,<sup>2</sup> the effect of a diet low in calcium experimentally in rats, is more likely to cause death of the fetus in utero or of the newborn, than to interfere with conception.

The clinical use of the female sex hormone in our patients has ample scientific foundation, which we would like to review. In 1906, B. C. Hirst derived a glycerin extract of fresh human corpora lutea for injection into patients suffering with various menstrual disorders, with some apparent changes. This work was reported by a student, in the *University Medical Magazine*, edited by the late William Pepper, and Charles H. Frazier, and on file in the library of the College of Physicians of Philadelphia. Similar work from Germany and France was published in 1907. In 1912, 1914, and 1915, came animal experimentations, until Frank in 1917 used fresh liquor folliculi to produce uterine growth in rabbits, publishing the results in 1922. Allen and Doisy<sup>3</sup> followed, showing that lipid follicular extracts of the hog when injected into castrated rats and mice cause striking growth in the female genitals. Much interest was attached to these reports, as evidenced by a great deal of work in the last two years. Allen, again, with Pratt and Doisy<sup>4</sup> showed that the female sex hormone is found in the corpus luteum and placenta, as well as in the ovarian follicles. They found also that the ovarian follicular hormone of the pig, sheep, hen, and human being gave positive tests, according to the smear test of Stockard and Papanicolaou.<sup>5</sup> This same group originated the rat unit as a means of measuring the female sex hormone, as the highest dilution of an extract which when injected into a spayed mature rat three times, four hours apart in one day, will show a positive vaginal smear on the third day. According to this method human females have seven rat units per c.c. of liquor folliculi.

In order to know more of the properties of the female sex hormone, Allen with M. M. Ellis<sup>6</sup> showed that exposure to intense violet rays will destroy its activity.

\*Presented at a meeting of the Obstetrical Society of Philadelphia, March 3, 1927



One of the valuable additions to the subject appears in further work of Frank, published in a series of papers in the *Journal of the American Medical Association*. Under the title of "An Analysis of Factors Producing Puberty," Frank, Kingery and Gustavson<sup>7</sup> demonstrated that by means of injections of the placental hormone of the human being, sexual maturity, follicle ripening, and ovulation may be maintained spontaneously in immature rats. Therefore, puberty is *not* due to removal of inhibitory glands, such as thymus and pineal, but to elaboration of a female sex hormone. With Goldberger, Frank<sup>8</sup> reports a new method of determining sex in the presence of malformation of the genital organs, i.e., in two cases, by injecting lipoid extracts of the blood into castrated mice, producing a positive estral vaginal smear.

The same men<sup>9, 10</sup> were able to report the technic and clinical applicability of the demonstration of female sex hormone in human blood, which begins to appear from ten to fifteen days before the onset of menstruation, increasing to considerable amount at menstruation, when it appears in the flow and disappears from the circulation. In this study, two results appear: (1) Ovulation time should be at the first appearance of female sex hormone in the blood, i.e., from ten to fifteen days before the onset of menstruation. (2) The female sex hormone appears in the blood of pregnant women as early as six and eight weeks, thereby giving probably the most accurate means of determining early pregnancy.

Papanicolaou,<sup>11</sup> working with Stockard, contrasts a specific inhibitory hormone of the corpus luteum with the female sex hormone, stating positively that the former is entirely separate and separable from the latter, although each may be present in the corpus luteum. This fact is supported by the work of Zondek and Ascheim<sup>12</sup> also on guinea pigs, as follows:

1. After complete removal of the corpus luteum, estrus is hastened.
2. Although the female sex hormone is found in the young corpus luteum, none is present in the late forms.
3. Lipoid luteal injections delayed estrus indefinitely.
4. There was no effect by oral feedings of luteal preparations.

Finally, clinical tests of the ovarian follicular hormone appear from Pratt and Allen<sup>13</sup> in two divisions:

1. *Animal*.—Experimental work on five spayed monkeys resulted in typical reddening and swelling of the vulva, with reddening of nipples, growth of uterus, and growth of vaginal epithelium with disappearance of white blood cells. Bleeding occurred in seven series when injections were stopped. The author gave thirteen series of injections of female sex hormone, varying from 6 to 190 units per series, covering from nine to twenty days each, giving two or three injections daily.

2. *Human*.—Four groups of women.

a. *Artificial Menopause* (operative).—Two injections daily for twenty-three days increased the size of the uterus, and produced a heavy sensation in the pelvis.

b. *Natural Menopause*.—Five daily injections of ovarian and placental extracts of five rat units decreased the number of flashes.

c. *Primary Amenorrhea*. (No menses after age of twenty).—Five series of injections, ovarian and placental extracts, one to three injections a day, from two weeks to two months. The total number of rat units injected, 15 to 90, failed to produce results.

d. *Scanty Menstruation*.—Six series of injections yielded some change in all cases.



After this introduction, we present results of the clinical use of the female sex hormone in a small group of women, using ovarian follicular fluid prepared by Parke, Davis & Co., as described in the following letter from their experimental medicine department:

"Our first ovarian products contained less than one rat unit per cubic centimeter. We were able steadily to increase the potency of the product until the last extracts of ovarian source were obtained, representing fifteen units per cubic centimeter. Because of the tremendous consumption of glandular material, however, it would not be practical to make a product from the ovarian source of the fifteen unit strengths.

"The placental extract (estrogen), however, can be made of higher potency. The product which we are sending you and the lot previously supplied was labeled '25 units per c.c.,' but actually tested about 35 units. We have in fact been able to make very much more potent extracts, as high as 150 units, per cubic centimeter. Unfortunately, however, such products are not practical, for the reason that the high refinement of the material undermines its stability. We found that the 150 unit extract had dropped to about 35 units in just a couple of weeks. Just how far we can go with the refinement of the product and still have a fairly stable preparation has not been determined. We feel, however, that we shall be able to maintain the 25 potency, and perhaps that we can go as high as 50 units per cubic centimeter; this remains, however, to be determined."

E. P. Bugbee and A. E. Simond,<sup>14</sup> using the Allen and Doisy rat unit for standardization of the Parke, Davis & Co. female sex hormone, showed that the effective dose should vary directly with the rat weight which would indicate the necessity for much greater dosage in human beings than our patients received. The problem of persuading a patient to receive two or three daily injections over a period of time was our greatest difficulty, and many of our patients failed to appear after a few doses. Such women were therefore rejected along with a group of patients treated rather irregularly nearly two years ago, when our follicular extract contained only about one rat unit per c.c. of fluid.

Our series then includes only 17 patients, each of whom received intramuscular injections of fresh lipoid extract of liquor folliculi from hogs in the form of an aqueous colloid solution that is readily absorbed, or a similar preparation of placental derivation. The dosage varied from 25 to 250 rat units in ten day series, and from 3 to 10 injections for each ten days.

#### GROUP I: MENSTRUAL DISORDERS

CASE 1.—Miss S. B., aged fourteen, had suffered with "allergic asthma," for five years. Menstruation began at ten, one period only, since when she has had only periodic leucorrhea and tender breasts, associated with increase in the asthma.

Female sex hormone: Seven injections, 175 rat units, in twenty-one days. No change.

CASE 2.—Mrs. M. N., aged twenty-four, married five years, was sterile. She had been previously treated by thyroid-ovary tablets. Menstruation began at fifteen, 30/1 or 2, scant, with pain and "head flushing." After dilatation and curettage the Rubin test showed that the fallopian tubes were closed. Section; adhesions; Estes operation one side, excision of tube. Thyroid-ovary by mouth;

menstruation still painful, very scant, and short, and occurs from one to two weeks late.

Female sex hormone: Twelve injections, 180 rat units, in 2 series (two months) produced two following periods 28/3, which were markedly increased in amount, without pain or headaches. Patient states that she is glad to have the injections if only for improvement in the periods.

CASE 3.—Miss L. L., aged sixteen, menses at thirteen, every eight weeks, lasting about seven days, with sufficient pain to require going to bed. She complains of constant vertex headaches with dizziness (three years) and peculiar laryngeal stridor. X-ray of pituitary and thymus negative. Wassermann, negative.

Female sex hormone: One series (seven injections), about 100 rat units, resulted in two periods thirty-two days apart, lasting seven days without pain. Headache continued, due to intracranial lesion.

CASE 4.—Mrs. E. S., aged twenty-nine, married five years. Menses began at thirteen, 28/3, and continued up to the age of twenty, when (1918), with nervous breakdown, the periods stopped completely and suddenly, followed by increase of weight from normal of 106 to 149 pounds. Examination shows "infantile uterus."

Female sex hormone: Thirty-four injections, a total of 520 rat units, plus electrical stimulation of uterus, resulted in no subjective change whatever; depth of uterus, two and a half inches (sound). Rubin test was not made; husband not examined.

CASE 5.—Mrs. E. J. S., aged thirty-four, married nine months, no conception. Menses: "showing" only four times in last sixteen months, since a twelve-hour intrauterine application of radium (unknown dosage) for metrorrhagia. Examination showed extreme hyperinvolution, uterus measuring only 3.5 cm. in depth.

Female sex hormone: Eighteen injections, a total of 450 rat units, in conjunction with uterine electrical stimulation, resulted in regular three-day periods. No conception yet.

#### GROUP II: STERILITY

CASE 6.—Mrs. J. M., aged thirty-eight, one child, aged fourteen, by first husband. Menses at fourteen and a half years, 26 to 32/5. Miscarried at two months, four years ago, plus curettage; no conception since. (Second husband.)

Female sex hormone: Two consecutive series, 200 and 300 rat units each, with no apparent change in menstruation. No conception. Husband not examined (refused).

CASE 7.—Mrs. B. T. B., aged thirty-one, married seven years, no conception. Menses began at thirteen, 28/5, no pain. "Flushing" of chest and face (endocrine). Examination showed a normal individual with exception of a small uterus. Dilatation and curettage, Rubin test negative. Thyroid-ovary pituitary tablets given. Husband competent.

Female sex hormone: Two series of injections, 90 and 120 rat units each, produced no apparent results, except a definite increase in sexual response.

CASE 8.—Mrs. M. N., aged twenty-six, married seven years. Menses at fifteen, 30/2; she complained of headaches and pain. No conception; gained 35 pounds. Dilatation and curettage plus Estes operation for closed tubes. Thyroid-ovary tablets without change in periods.

Female sex hormone: One series, 10 injections of follicular extract, a total of 150 rat units, produced an absolute disappearance of pain and headaches, and an increase of amount and duration of menstruation. Husband competent. No conception.

CASE 9.—Mrs. DeF. W. E., aged twenty-six, married four and a half years. Menses at fifteen, 31-32-day type, lasting four days, occasional pain. No conception. Uterus anteverted plus stenosis. Husband competent. Rubin test satisfactory. Menstruation distinctly less since curettage and uterus smaller.

Female sex hormone: Follicular injections; one series only of 175 rat units. Result: First following period lasted eight days and free; next period was normal. No conception.

CASE 10.—Mrs. A. I., aged twenty-nine, married three and a half years. Menses at twelve, 28/2, only a trace (one pad). Only conception was in 1924, miscarried at three months; she has gained 24 pounds since marriage. Infantile uterus, anteverted. Thyroid-pituitary-ovary tablets. Follicular injection, two series, a total of 200 rat units; resulted in last menstrual period of three days, with flow (3 pads). Weight down to 128 pounds. No conception.

CASE 11.—Mrs. J. H., aged twenty-six, married seven and a half years. Only conception occurred seven years ago, miscarried at three and a half months. Menses began at sixteen, occurring at intervals of from six to fourteen months, with pain; the last period was thirteen months ago. Uterus infantile. This patient has extreme hypertrichosis with beard and mustache; painful coitus, no sexual reaction whatever. Weight 138.5 pounds.

Female sex hormone: After 4 injections (60 rat units), the patient menstruated for three days. Followed by injections twice a week (23—total 345 rat units) this has resulted in no period yet, but has yielded normal sexual appetite and orgasm for the first time. Examination shows a very soft cervix and corpus uteri.

CASE 12.—Mrs. A. W., aged twenty-six, married four years, no conception. Menses began at thirteen, at intervals of from 3 to 8 months, scant. Examination; obese, hypertrichosis, infantilism. No sexual response. Reducing diet.

Female sex hormone: Injections, twice a week for five months, a total of 615 rat units, beginning 4/19/26. Menstruated as follows: June 4, July 11, August 15, September 14; first time with cramps, but none since. Normal sexual reaction. Reduced from 167 to 142 pounds. Husband competent. On 10/28/26, curettage, Rubin test satisfactory. Last period Nov. 26; patient now shows a normal three months' pregnancy.

CASE 13.—Mrs. R. D., aged twenty-four, married seven years. No conception. Menses every two to seven months, of 5 days' duration. Examination showed anteverted, infantile uterus. Obese, hypertrichosis. Curettage, Rubin test satisfactory. Thyroid-pituitary-ovary tablets, 50, followed by three monthly periods.

Female sex hormone: Follicular injections, 2 series (January and February, 1926), total 225 units, without any further treatment. Menses remained normal (28/3). 9/2/26 miscarried, University Hospital, ten weeks' pregnancy. Second conception occurred without further treatment, showing normal progress.

CASE 14.—Mrs. M. L., aged thirty-one, married four years. No conception. Menses 24/4, no pain. A woman lawyer, with entire absence of feminine traits, no sexual response, hypertrichosis, infantile uterus plus anteversion. Rubin test satisfactory. Rest, iron, and one series of follicular injections (135 rat units) followed by no period, pregnancy; delivered at eight months.

CASE 15.—Mrs. L. B. H., aged thirty, married four years, menses at fourteen, 28/2-5, no pain. No conception. Examination: normal; April, 1926, curettage, showing hyperplasia of endometrium. Rubin test satisfactory. Husband competent.

Female sex hormone: January one series, 250 units, follicular hormone, followed by sense of stimulation; missed February period and is now definitely pregnant.

CASE 16.—Mrs. H. N., aged twenty-two, married one year. Menses began at fourteen, occurred every two to three months before marriage; more regular after. Thin, "masculine type" marked general hypertrichosis, with very infantile uterus, and sexual frigidity. Husband apparently incompetent.

Female sex hormone: Thirty-five injections, totaling 350 units in six months; also slow faradic electrical cervical stimulation. Result: periods less infrequent, i.e., the uterus still very small; menses every six weeks, lasting four days, scant; low sexual response; conception; pregnancy now in sixth month.

CASE 17.—Mrs. S. S., aged twenty-nine, married six and a half years, no conception. Husband competent. Has been treated recently by "stimulating" x-ray exposures. Sexual frigidity. Examination shows normal pelvic organs. Rubin test shows each tube patent at 80 mm. Hg.

Female sex hormone: Three premenstrual series of injections, totaling 750 rat units, produced *marked* increase in sexual inclination and response, but no pregnancy yet.

#### SUMMARY

Of a total number of 17 cases, five were treated for menstrual disorder primarily, with no result in two of the five. Of the twelve potential mothers, six complained of marked reduction in menstruation, yet all were improved, and three of this six conceived, following the female sex hormone injections. Of the six remaining potential mothers, showing no menstrual reduction, two conceived, giving five pregnancies out of twelve possibles, one woman conceiving twice.

#### CONCLUSIONS

1. No ill effects, either local or general, were experienced.
2. Large doses, such as 25 to 50 rat units daily in ten- to fifteen-day series monthly, should help to regulate infrequent menstruation.
3. After excluding *all* other possible causes of sterility, the female sex hormone was used with apparent success, in patients with normal menstruation.
4. The female sex hormone altered the menstrual phenomena after thyroid administration had failed.
5. Normal menstruation is not much affected by injection of follicular hormone. All patients with "sexual frigidity" were relieved.
6. The placental source of the female sex hormone is the logical derivation for practical purposes.
7. At this writing, preparations are under way for testing, by rat experimentation, the amount of hormone in the patient's blood before and after injection. Until this has been done, we shall not recommend general use of the female sex hormone, especially since commercial preparations of the hormone have been found to contain not even one mouse unit.

A careful assay of recent samples of "Estrogen" by Dr. Joseph Hayman, has demonstrated a potency of more than 25 rat units per mil, according to the standardized vaginal smear test after injection of spayed rats.

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## OBSERVATIONS ON CERTAIN FEATURES OF THE PATHOLOGY, SYMPTOMATOLOGY, AND TREAT- MENT OF RETROVERSION\*

### A PRELIMINARY REPORT

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THE statistical studies of this paper are based upon the records of 1,153 women with retroversion who were admitted as in-patients to the Gynecologic Service of the John Sealy Hospital, principally as clinic patients of the Department of Gynecology of the University. The clinical observations are based upon these patients (most of whom were directly under my care) and upon 357 patients of my own, observed in office practice, of whom 93 are included in the Sealy Hospital series. Inasmuch as 157 (44 per cent) of these office patients were recent puerperal cases which were relieved by nonoperative measures, and 64 (18 per cent) did not present valid indications for operation, it was hoped that weight might be given to these (and other) percentages by a statistical study based upon the large number of patients attending the Out-Patient Department of the Hospital; this, however, did not prove feasible on account of a faulty system of indexing, which existed until recently. The statistics quoted, therefore, are based upon a selected group of patients in whom certain symptoms existed which, in the opinion of the out-clinic staff, required either closer study or operative treatment, and hence would suggest a higher percentage of cases requiring operative treatment than is true for the unselected mass of patients in whom retroversion is found in the course of routine examination. The ideal statistical study would be based upon the symptomatic and physical findings in an

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adequate number of unselected women, both sick and well. The possibility of such a survey is obviously remote; hence, it will probably never be possible to say just how many, of all women, will fall into the various groups as regards symptomatology, pathology, and the choice of treatment. It is obvious that the conscientious obstetrician will find a higher percentage of cases which do not require operative treatment than will the gynecologist to whom patients with puerperal retroversion do not present themselves until after the possibility of cure by nonoperative measures has been reduced to a minimum.

A consideration of the whole subject of retroversion would require the writing of a small monograph; on this account the commonly accepted features of the subject have been eliminated from this paper, and only those points included which have been of special interest to me. I have adopted these points as reasonably tenable working hypotheses, and as such, they may be stated as follows:

1. Retroversion, uncomplicated by any demonstrable inflammatory or neoplastic condition, may produce severe symptoms. (The impossibility of recognizing, in some cases, the change produced by old inflammatory lesions deep within the tissues, is admitted.) This is demonstrated by three observations:

- a. That 806 patients, of whom the majority were clinic patients in the lower walks of life, presented no other demonstrable cause for symptoms sufficiently severe to make them consent to operation for their relief. (A certain number of these patients had chronic endocervicitis or cervicitis, but the symptoms complained of were not wholly accounted for by this condition.)

- b. That 82.7 per cent of the patients adequately followed up admitted virtually complete relief of symptoms, and 11.9 per cent sufficient relief to make them consider the operation well worth while.

- c. That patients with definite symptoms often have these symptoms, promptly relieved by reposition and pessary support, to recur with the recurrence of retroversion.

2. The majority of cases of retroversion, otherwise uncomplicated, present definite evidence of more or less constant venous congestion of the internal genitals.

3. Following, and very possibly resulting from, this congestion, a progressive replacement fibrosis frequently occurs, involving most markedly the myometrium and the ovaries.

4. Certain fairly definite symptom-complexes occur in otherwise uncomplicated cases of retroversion, and these symptom-complexes have, in this series of cases, been quite constantly associated with the pathologic changes mentioned above (although the degree of congestion and fibrosis cannot be always predicated from the severity of the symptoms).



5. Uncomplicated retroversion is frequently associated with a status of general ill-health with anemia, and this frequently cannot be relieved until after the correction of the retroversion. No explanation is advanced for this phenomenon.

6. The nonoperative treatment of retroversion is eminently successful in appropriate cases, and should be much more extensively taught and practiced.

7. Certain cases of retroversion are amenable only to operative treatment, and the indications for operation (including in doubtful cases the wearing of a pessary as a therapeutic test) are, to me, definite enough to form a satisfactory basis for the selection of cases for operation in practice.

#### PATHOLOGY AND SYMPTOMATOLOGY

*Dysmenorrhea.*—It was interesting to note that, contrary to tradition, very nearly as many patients complained of obstructive (cramping) dysmenorrhea as of congestive dysmenorrhea. In a very large number of those complaining of menstrual cramps, the traditional causes of this symptom were absent; i.e., flexion or stenosis of any type (congenital, inflammatory, cicatricial, neoplastic, etc.).

Pain of ovarian type during the premenstrual and menstrual periods was found to be almost always present in cases of advanced ovarian fibrosis; yet it was sometimes present when little or no gross pathology of the ovaries could be demonstrated. I have come to regard this symptom, therefore, not as diagnostic, but as highly suggestive of some ovarian pathology, usually of a fibrotic nature. I do not believe that a positive differentiation from the somewhat similar pain due to varicocele can be made; yet this differentiation was correct in a surprisingly large number of cases.

*Congestion.*—Very careful study of the ovarian and uterine veins in living patients has failed to show either any constant localization of the dilatation of major veins or any definite mechanical obstruction to the venous flow. The veins are apparently simply engorged (although varicosity may be present), and this condition may involve the uterine or ovarian veins or both, and in the latter may extend above the pelvic brim. On reposition the engorgement may or may not disappear promptly; it usually does disappear in the veins of the broad ligament, to reappear on turning the uterus backward again. No mechanical obstruction, such as torsion, could be observed, even when the veins were exposed by reflection of the overlying peritoneum.

Whether or not the major veins are engorged, the congested uterus is distinctly dusky-red or even bluish, and mottled; its consistency is irregularly softer than normal, and its contour is superficially uneven. Reposition is followed by the appearance of a more normal and even light red color and (usually) by contraction of the myo-

metrium, which makes the organ firmer and paler; when the uterus is very boggy, definite reduction in size may be noted as a result of this contraction.

The microscopic picture of the myometrium at this stage is simply one showing dilated veins with some perivascular fibrosis in otherwise normal tissues. The endometrium in such a uterus usually presents the picture of some stage of hyperplasia.

Menorrhagia is the most frequently observed menstrual symptom of this stage—increase in the amount or in the duration of the flow, or both.

Less definitely, and very much less frequently, there is evidence suggestive of ovarian hyperfunction, with a tendency to decrease of the menstrual interval. There is no definite proof that there is a quantitative relation as regards the amount of flow in cases of ovarian hyperfunction, although menorrhagia is generally included in descriptions of this condition. Inasmuch as in the private office series many of these cases of menorrhagia associated with decreased interval occurred in girls from fourteen to twenty years old, in whom such a phenomenon is frequently seen in the absence of retroversion, the assumption that ovarian hyperfunction occurs as a result of an excess of venous blood due to retroversion cannot be made. Parenthetically, the late development of a decreased interval was found in this and in another study to be the menstrual symptom most constantly associated with acute pelvic inflammation, and is interpreted as being very probably due to hyperemia involving the ovaries before the actual inflammation has reached them.

*Fibrosis.*—Some two or three years after beginning work in the Department of Gynecology of the University of Texas, I noticed that a considerable number of the patients with retroversion of long standing presented a rather definite series of changes in the character of the menstrual phenomenon. At first, there was a progressively increasing menorrhagia, the amount rather than the duration of the flow being increased. Later, the duration of flow was increased, the amount of flow remaining profuse, occasionally increasing, or, frequently, decreasing, especially during the latter days of the menstrual period. Finally, or in some cases coincidentally with any of the irregularities just mentioned, the menstrual interval became irregular and lengthened, the patient menstruating at intervals of from five or six weeks to three months. In most of these cases a preexistent menorrhagia continued, with great variations in the daily amount.

Some of the textbooks of that period made mention of the menorrhagia, attributing it to endometrial hyperplasia, but the other phenomena were not mentioned in any of the literature available.

On searching for an explanation of these so-frequently-seen phenomena, it became apparent that there was, in the cases of fairly recent

origin, a definite endometrial hyperplasia, which would account for the excessive amount of menstrual hemorrhage. In many cases of longer standing, this hyperplasia was absent, and the endometrium was thin, with an excess of fibrous tissue of an immature type in the stroma. The most constant finding, one in fact virtually universal in cases of long standing retroversion, was a replacement fibrosis of the myometrium, with which was associated a marked vascular and perivascular sclerosis. These conditions would easily account for the prolonged bleeding on the theory that the contractility of the vessel walls and the compression effect exerted on the vessels by the network of muscular fibers in the uterine wall was progressively impaired as these muscle cells were hampered and actually replaced by a progressively maturing type of fibrous connective tissue.

The gross appearance of these uteri varies with the degree of fibrosis. The earliest change noted is the appearance of irregular patches of abnormally light color, especially visible when the uterus is in retroversion and is dusky from engorgement with venous blood. On looking at the surface obliquely, the patches are seen to be slightly depressed. In later stages the patches spread, whiten, and become still more depressed. Ultimately the irregularity of surface may become so marked as to be palpable on vaginal examination. In such very advanced cases the bleeding may be continuous, and for obvious reasons not well or at all controlled by oxytocics. Radium, by eliminating the cyclic hyperemia due to ovarian activity, is usually the best treatment for these very advanced cases, but hysterectomy may be preferable or necessary.

The hypothesis that the menorrhagia could be accounted for in early cases by endometrial hyperplasia and in the later cases by replacement fibrosis of the myometrium seemed plausible, but this did not explain the increasing irregularity of the menstrual interval. On further examination, it became apparent that the ovaries in these later cases shared in the replacement fibrosis. A hypothesis was accordingly developed that this fibrosis in some way interfered with the ovaries' share in the menstrual phenomenon and that this interference probably consisted of an impairment of the vascular supply of the maturing follicles, and, in the advanced cases, of a mechanical resistance to the growth of the follicles to an extent which produced a harmful internal pressure, resulting in damage to the essential cells of the follicle. This supposition has not yet been corroborated by the finding of any material diminution of the blood supply to the maturing follicles and the corpora lutea, except as far as may be inferred from the fact that in these cases there is a very marked perivascular sclerosis and often an obliteration of the vessels themselves.

It can, however, be shown that in some of these cases the granulosa layer is thin; its cells are in bad condition, as shown by poor staining qualities, and the retained ovum, when seen, is dead and disintegrat-

ing. In advanced cases, with a great increase in fibrous tissue in the ovarian stroma, very often no maturing follicles or corpora lutea can be found, and these patients are virtually amenorrheic.

With regard to the multicystic conditions which are frequently described, I am inclined to think that there are two distinct types: the first, which may be called the polycystic ovary, seems to be due to a preponderance of cystic atresia over the more usual obliterative atresia, shows little or no excess of fibrous tissue, and is a fertile type of ovary; and the second, which may be called the fibrocystic ovary, in which the major cysts are retention cysts due to the inability of the matured follicle to rupture through the densely fibrous tunica albuginea and stroma, and is a relatively infertile type of ovary.

It must be admitted at this point that the number of histologic specimens so far examined is not sufficient to be considered as making these assumptions conclusive; yet in all cases examined the degree of microscopic fibrosis was found to correspond accurately with what was expected from the gross appearance. The fibrotic areas in these ovaries are whiter than the normal; the ovaries may be diffusely or irregularly enlarged, or, in the late stages, quite shrunken. The surface is usually not fissured (in contrast to the appearance of the normal ovary in the period of premenopausal atrophy and sclerosis). On section, the slightly translucent appearance of the normal stroma is replaced by a white scar tissue, which on close examination may be seen to be most dense under the surface and along the trabeculae. Imbedded in this fibrous tissue are cysts of varying size whose contents are often under markedly excessive tension, and may be bloody. The corpora lutea are very frequently abnormal in appearance, and their walls may be stained a chocolate brown with altered blood. (These must not be confused with endometrial implantation cysts.)

The individual symptomatology of this stage seems to depend upon the balance between the uterine and ovarian dysfunctions. In considering a combination of these two conflicting clinical states, it is theoretically possible that either one may dominate the picture, or that in a given case the major features of each may be associated. Thus, assuming the hypotheses of this paper to be true, a given patient may present an increased and possibly irregular interval (due to ovarian fibrosis) and a menorrhagia (due to uterine fibrosis). As a matter of fact, such cases are common, but the explanation given can as yet be accepted as only a tenable hypothesis.

Table I shows the percentages of cases presenting (at the time of admission) the various menstrual abnormalities mentioned. A considerable number of these patients gave histories of earlier menstrual abnormalities of a different type, and it was in this group, especially as supported by the histories of the more intelligent patients seen in private practice, that the incentive for the present study was found.

In the tables the term *primary* indicates a condition existing from the beginning of established menstrual life; the term *secondary* indicates that the condition developed after a variable number of years of a normal menstrual status or of some other type of menstrual abnormality. It was found impossible to determine in all cases whether the *secondary* symptoms dated to the occurrence of an acquired retroversion; conversely, in many cases *secondary* symptoms made their appearance after a variable period of normal menstrual status in patients whose uteri were known to be retroverted. This last class of patients constitutes the most interesting group, occurs most frequently in private practice, and is most likely to be benefited by the application of the principles of treatment outlined later in this paper. The term *uncomplicated* means that no gross evidence of neoplastic or inflammatory disease was found, except for a certain number of cases of chronic cervical inflammation.

TABLE I. BASED ON THE MENSTRUAL HISTORIES OF 806 CASES OF UNCOMPLICATED RETROVERSION SELECTED FOR ADMISSION TO HOSPITAL (APPROXIMATELY 70 PER CENT OF THE TOTAL NUMBER OF CASES OF RETROVERSION ADMITTED)

Primary Menorrhagia	10.6%
Secondary Menorrhagia	11.1%
Primary Decreased Interval	6.9%
Secondary Decreased Interval	7.4%
Primary Increased Interval	7.8%
Secondary Increased Interval	5.5%
Primary Oligomenorrhea	8.3%
Secondary Oligomenorrhea	2.7%
No Menstrual Abnormalities	40.0%

*Sterility and Abortion.*—Owing to the fact that routine microscopic examination has not been done, and, in the earlier cases, adequate descriptions of the gross pathology were lacking, sterility and abortion can be statistically correlated with the basic pathology only indirectly through the symptomatology; yet these statistics, indirectly obtained, conformed very closely with the statistics based upon the smaller group in which adequate record of the pathology had been made, and were further confirmed by personal observation. For these reasons the present paper can be considered as only a preliminary report. The recent establishment of a special Laboratory of Gynecologic Pathology which will permit the routine detailed study of the pathology of these cases will make it possible to formulate a final report when a sufficient number of cases has accumulated. With the above limitations, the following observations were made.

In the group of cases of *primary* menorrhagia, practically all showed definite evidence of marked congestion, with hyperplasia of the endometrium in the earlier cases and with varying degrees of fibrosis of the uterus in the older cases. Quite a number of these patients presented a hypoplastic or infantile uterus with ovaries of more or less



normal appearance, and may represent the condition known as uterine insufficiency. In the patients with *primary* decreased interval, no constant gross pathology was noted. In the patients with increased interval or with oligomenorrhea, the most usual finding was of some type of hypoplasia, either of uterus or of ovaries or of both.

It must be admitted at the outset that the figures are vitiated by the inability to allow for sterility, due to the employment of contraceptive methods; yet among the clinic patients it was found that contraception was almost unknown and still more rarely practiced.

In considering sterility two definitions were formulated:

*Sterility*: failure to conceive during a period of at least three years of married life.

*Married*: subjected to the opportunity for conception which occurs in normal married life. This definition was adopted in order to include the large number of legally unmarried negroes and to exclude the wives of seamen, etc., and the legally married women not living with their husbands.

Approximately 91 per cent of the uncomplicated cases admitted to the hospital occurred in *married* women. A larger percentage of *unmarried* patients occurred in the private office series, after excluding the recent puerperal cases. A curious fact was noted, which may be significant, that the percentage of *unmarried* women was higher among women with *primary* increased interval and with oligomenorrhea than in any other group: 17.6 per cent and 22.2 per cent, respectively, as against an average of 8.8 per cent for all other groups, 4.4 per cent in the menorrhagic group, and 5.8 per cent in the group without menstrual abnormalities.

If the various menstrual abnormalities quoted in Table II could be shown to correspond accurately with the pathologic findings, the table would be of much more definite interest than it is as a mere correla-

TABLE II. STERILITY AND ABORTION ASSOCIATED WITH "PRIMARY" MENSTRUAL ABNORMALITIES

	COMPLETELY STERILE	STERILE AFTER ABORTION	STERILE AFTER ABORTION AND FULL-TERM CHILDREN	STERILE AFTER FULL- TERM CHILDREN	NOT STERILE— ABORTIONS ONLY	NOT STERILE—ABORTIONS AND FULL-TERM CHILDREN	NOT STERILE—FULL- TERM CHILDREN ONLY	TOTALS HAVING ABORTIONS	TOTALS HAVING FULL- TERM CHILDREN	STERILE AFTER ONE OR MORE PREGNANCIES	TOTAL STERILE
Menorrhagia	31.8		9.1	4.5		9.1	45.4	18.2	68.1	13.6	45.4
Decreased Interval	15.4		7.7	23.1		30.8	23.1	38.5	84.7	30.8	46.2
Increased Interval	35.7	14.3				28.6	21.4	42.9	50.0	14.3	50.0
Oligomenorrhea	35.7	7.1		21.4	7.1	14.3	14.3	28.5	50.0	28.5	64.2
No Abnormalities	19.7	3.7	8.7	16.0	3.7	13.6	34.6	29.7	72.9	26.4	46.1



tion of sterility and abortion with these special points in the symptomatology. Taking the figures as they stand, and assuming that the figures given in the last line represent what may be called the norm for patients of the type included, several suggestions become apparent:

1. That patients with primary decreased interval show a primary sterility rate about 75 per cent above the normal and a capacity for producing full-term children about 16 per cent above the normal, while the abortion rate is about 37 per cent above the normal. The explanation at once suggests itself (if we accept that menstruation is a signal indicating the maturation of an ovum) that more than the normal number of ova are being produced in these cases (?).

2. That patients with primary menorrhagia show a primary sterility rate about 60 per cent above the normal, but that their capacity for producing full-term children is only about 7 per cent below the normal, while the abortion rate is 37 per cent below the normal. This suggests that ova find difficulty in implanting themselves upon the menorrhagic endometrium, but once established are likely to go on to maturity (?). Where it was possible to obtain a dependable history (as in the case of intelligent private patients), it was noted that in the *primarily* menorrhagic group a considerable number of *married* women had observed that on one or more occasions menstruation had been delayed for a week or more, to come on finally with excessive cramping, menorrhagia, and the passage of clots. This suggests that in some of these cases very early abortion may occur, possibly from an inability of the endometrium to nourish the ovum past a certain stage in its development. Some weight is lent to this supposition by the finding of tissues of apparently fetal origin in the scrapings from two such patients.

3. That the group of patients with increased interval and the group with oligomenorrhea each show a primary sterility rate about 80 per cent above the norm, and a capacity for producing full-term children about 31 per cent below the norm. The group with increased interval has an abortion rate 43 per cent above the norm. This suggests that fewer ova are being produced, and their quality (as judged by their chances for survival) is poor. The low abortion rate can easily be accounted for by the fact that these women very rarely become pregnant at all, as evidenced by a total sterility rate of nearly 40 per cent above the normal. Obvious explanations for this phenomenon suggest themselves, but cannot at this time be considered as susceptible of even tentative proof.

In the group of patients showing *secondary* menstrual abnormalities, it was found that about 70 per cent of the patients with menorrhagia showed congestion only, while the remainder showed evidence of fibrosis of the uterus. No special gross pathology was found to be asso-

TABLE III. STERILITY AND ABORTION ASSOCIATED WITH "SECONDARY" MENSTRUAL ABNORMALITIES

	COMPLETELY STERILE	STERILE AFTER ABORTION	STERILE AFTER ABORTION AND FULL-TERM CHILDREN	STERILE AFTER FULL- TERM CHILDREN	NOT STERILE— ABORTIONS ONLY	NOT STERILE—ABORTIONS AND FULL-TERM CHILDREN	NOT STERILE—FULL- TERM CHILDREN ONLY	TOTALS HAVING ABORTIONS	TOTALS HAVING FULL- TERM CHILDREN	STERILE AFTER ONE OR MORE PREGNANCIES	TOTAL STERILE
Menorrhagia	4.4		4.4	26.1	8.7	26.1	30.4	39.2	87.0	30.5	34.9
Decreased Interval	20.4	6.6	13.3	20.0	6.6	13.3	20.0	39.8	66.6	39.9	59.9
Increased Interval	9.9	9.9		36.4		18.2	27.3	28.1	81.9	46.3	56.2
Oligomenorrhea	60.0	20.0				20.0		40.0	20.0	20.0	80.0
No Abnormalities	19.7	3.7	8.7	16.0	3.7	13.6	34.6	29.7	72.9	26.4	46.1

ciated with a decreased interval. In the groups with increased interval and with oligomenorrhea fibrosis, especially of the ovaries in the former group, was the rule, the exceptions showing a hypoplastic condition of the uterus, of the ovaries, or of both.

In checking up the histories of the cases listed in Table III, it was found that the sterility and abortion rates for the periods before and after the type of menstrual abnormality existing on admission correspond quite accurately with the figures for the coexistent types of menstrual abnormality as shown in Table II. The tables resulting from this checking up are too cumbersome for inclusion in this paper, especially since by subdivision the number of patients in each group became too small to form the basis for statistical study. One very interesting thing was noted, namely, that women who were markedly fertile early in life, with normal or menorrhagic histories, seemed very prone to develop a secondary increased interval with subsequent sterility; this accounted for the apparently paradoxical figure indicating that patients with secondary increased interval stood third in their ability to produce full-term children (81.9 per cent as against a normal rate of 72.9 per cent).

#### TREATMENT

The nonoperative treatment of retroversion, which for a time fell into discredit, has a distinct and very useful place. Such treatment will be found ineffective in most cases of congenital retroversion and in many cases of acquired retroversion of long standing. In its simplest form, nonoperative treatment consists of avoidance of the dorsally prone position and of the employment of exercises designed to encourage the uterus to tilt forward. Most of these exercises have the knee-chest position as a basis. A very effective method is to have the patient, in the knee-chest position, to raise the knees about six inches from the floor and then to drop them again with a jolt. A

similar effect is obtained by the more strenuous "elephant walk" and "mule-kick" exercises.

The employment of these simple measures in recent puerperal cases during the past two years has had the following effect: the percentage of cases requiring reposition and pessary support has been reduced from 40 per cent to 12 per cent (for the last twelve months).

It is only in the recent puerperal cases (and in a few cases of "intermittent" retroversion) that these exercises will suffice, and resort must then be had to reposition and pessary treatment. Generally speaking, I have found the use of the pessary limited to the following four situations:

1. Puerperal retroversion, in which permanent correction can be secured in from 60 to 70 per cent of cases treated within six weeks after parturition, or after the occurrence of retroversion (which may not take place until some months postpartum) especially if the size and weight of the uterus be reduced by oxytocics.

2. To support the retroverted pregnant uterus until its increased size will prevent the recurrence of retroversion.

3. As a test of the relation of retroversion to obscure symptoms or to sterility. If the symptoms disappear while the uterus is held in position and recur with the recurrence of retroversion after removal of the pessary, operation may be undertaken in these cases with greater certainty of relief; and this experiment is less costly in every way than experimental laparotomy.

4. For the relief of symptoms during a period of postponement of operation, as in the case of a school teacher waiting for vacation, or in a patient suffering from some disease which contraindicates for a time anesthesia or operation.

In developmental (nonpuerperal) cases and in puerperal cases where correction is attempted later than six months after the occurrence of the retroversion, pessary treatment will usually prove of no permanent value, and resort must be had to operation.

Patients without symptoms, who are not sterile and do not abort, should not be treated. The development of a secondary irregularity of menstruation with an increased interval, or with a decreased amount of flow, or with both, is an indication for prompt operation if fertility is to be preserved. Otherwise, the decision in favor of operation is based upon the severity of the symptoms, if nonoperative treatment has failed or is not indicated (as in cases of developmental retroversion or of puerperal retroversion more than two years old).

To review the myriad operations devised for the correction of retroversion would be useless; the effectiveness of any such operation must be judged by: (1) the degree of correction of the retroversion; (2) the permanency of this correction under the stress of normal life and childbearing; (3) the absence of undesirable anatomic conditions

produced by the operation; (4) absence of bad effects upon pregnancy and labor, and (5) operative mortality and morbidity.

In the Department of Gynecology of the University of Texas the operation most frequently employed during the past fourteen years has been that of ventrosuspension by the technic of Dr. George H. Lee. This technic consists of the apposition by (usually) three sutures of the *lower anterior* surface of the uterus to the anterior parietal peritoneum, and is accomplished by simply including in the first three stitches of the peritoneal closure of the laparotomy wound a portion of the anterior uterine wall *well below the fundus*. These stitches include about one-half the thickness of the uterine wall, and are, on an average, about one centimeter long and one-half centimeter apart. Some years ago, I suggested that the lowest stitch be placed just above the utero-vesical fold, avoiding the active segment of the uterus and reducing or eliminating the opening below the point of suspension through which internal hernia might occur. It is necessary that chromic cat-gut be used. By this procedure retroversion is fully corrected. The permanency of the correction may be judged best by the fact that of 665 women in whom this operation has been performed at John Sealy Hospital from January, 1912, to December 31, 1926, only 3 returned for the correction of recurrent retroversion, and not over 8 (the exact number not being available) have been seen by members of the staff, with recurrence.

The operation certainly produces at first a most unanatomic state of affairs, the uterus lying wholly above the pelvic brim and apposed to the abdominal wall. Recent studies, by x-ray and as patients were reoperated upon for other conditions, have shown that the parietal peritoneum at the point of attachment slides downward and backward, finally coming to lie behind the pubis, so that the uterus, originally lying too high and too far forward, comes to lie in (as far as we have been able to judge) about the correct anatomic position. The possibility of hernia under the ventrosuspension band exists; but as yet such an accident has not been seen in this clinic, although there have been two cases of hernia through openings made by *round ligament* operations. The production of a long fibrous band by traction of the uterus has been seen in only three cases, the majority of those subsequently operated upon for other pathologic conditions showing a very slight pulling-out of the fibrous union, most of the required elongation having been brought about by the pulling-out of a bundle of tissue from the anterior uterine wall. This tissue presumably hypertrophies and involutes with the rest of the uterus, judging by its appearance in patients operated upon after having borne children subsequent to ventrosuspension. As regards the effect of the operation upon pregnancy and labor, on account of the floating character of the clinic patients, who come from all over Texas and southern Louisiana, and

refuse to answer questionnaires, it has been possible to trace only 204 cases of all classes over a period of as much as three years. Of these 204 patients 20 were completely sterile on account of salpingectomy. Of the remaining 184, 98 have borne from one to five children each (a total of 129) after the ventrosuspension. The exact figures are not available, but the incidence of abortion was much lower and the incidence of dystocia no greater than the average for women not operated upon in the clinic and in private practice. Unfortunately, in a number of the earlier cases no record of the pathology is available; but from a study of the later cases it is obvious that the success of treatment as regards fertility is most marked in the menorrhagic group, and that no relief of sterility occurred in any case presenting a *secondary* oligomenorrhea with irregular and increased interval of more than two years' standing.

The operative mortality in these 665 ventrosuspensions was three, the cause of death in one uncomplicated case being acute yellow atrophy of the liver; in another, gas bacillus infection one month after operation; the other case being one of suppurating tubal pregnancy, the patient dying of peritonitis. Exact figures on postoperative morbidity have not been compiled, but it was the experience of Dr. Lee, shared by me, that there was greater and more prolonged pain after round ligament operations than after ventrosuspensions.

#### IMMEDIATE REPAIR OF THE CERVIX AFTER LABOR\*

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THE safety of labor in a properly managed maternity, with a staff of adequate experience and skill has of late years become so great that the mortality approaches the vanishing point. Proper prenatal care has aided in greatly diminishing the toll taken by toxemia, hospital sepsis has done away with childbed fever and the obstetrician of adequate training either conducts his case so that hemorrhage does not occur, or if he should encounter it, he masters it in all but an occasional exceptional case. In our own hospital for the past six years the maternal mortality has been 0.26 per cent. In 1926 in 847 cases no maternal death occurred. Sixty-seven per cent of the cases in the Maternity during 1926 were managed by the four men who make up its staff and the remainder by a small group of outside men who adhere carefully to the prescribed technic. This is not an exceptional record but is about what may be expected from any similarly managed institution. Results so far as mortality is concerned in trained hands in properly equipped institutions are exceedingly gratifying.

\*Read at a meeting of the Chicago Gynecological Society, April 15, 1927.



We are still lacking in the attention given to some of the common lesions which are caused by labor. In a recent paper I presented some figures in regard to retrodisplacement in pregnancy and labor and at this time I wish to discuss another of the very common results of labor trauma. A large part of gynecologic operative work concerns itself with the repair of the damage done by labor. As we have succeeded rather well in preventing the major disasters of obstetrics, at least in good maternities, is it not time to consider some of the minor casualties and to try to decrease their frequency?

Routine inspection of a large number of cervixes a few weeks or months after labor will show a large number of pathologic lesions. Routine postpartum examination is not done by many practitioners as will be indicated by questioning any considerable series of obstetric or gynecologic patients. Pathology varying from a small area of erosion to deep or multiple tears, and extensive ectropion with large red areas which bleed at a touch may be found. These findings should no longer be dismissed as merely incidental and unimportant. A proper regard for the welfare of the women demands first, that such pathology be prevented if possible, and second, that if it occur, it should be treated.

A review of recent gynecologic literature indicates an increased interest in the pathology of the cervix and in the treatment of cervical lesions. The importance of cervical diseases, particularly chronic inflammations with their resulting irritation of the cervical tissue, as a possible factor in the production of cancer, has long been a subject of discussion. The importance of the infected cervix as a focus from which secondary infections of more or less distant structures may originate is discussed from time to time. While I believe that the cervix is rather infrequently the source from which metastatic infections arise, the repeated raising of the question is an indication of the present interest in cervical pathology. The interest in cervical disease and its treatment is entirely proper, for nowhere else in the body is pathology, as extensive as that which is daily seen in the cervix, permitted to remain over long periods of time untreated. It is merely because cervical lesions are ordinarily out of sight, and only visible when exposed by means of a speculum, and because most ordinary cervical lesions produce little or no disability, that patient and physician are so neglectful of them.

New methods of operatively disposing of infected tissue without greatly changing the cervical structure or seriously impairing its ability to permit normal delivery have been perfected and widely discussed. Nonoperative methods of treating leucorrhea, erosion and ectropion, particularly the use of the electric cautery as suggested by



Dickinson, have been extensively used. These have added distinctly to our resources in managing cervical lesions and are deserving of the praise they have received.

Without giving too much importance to the somewhat nebulous subject of precancerous lesions, chronic inflammatory conditions of the cervix probably play some part in the production of cancer. Attempts to do away with these conditions are right and proper and deservedly engage the surgeon's attention. But may we not go a step further? A large part of the cervical lesions upon which the gynecologist operates, or which he treats by other methods, originate at labor. Is it not possible, by closer intranatal and postnatal attention to the cervix, to diminish later cervical pathology? A careful inspection of the cervix after delivery, even in women who have delivered spontaneously, will show a considerable number of cervixes which show visible damage. For example, a few days before this was written, a primipara of twenty-eight, upon whom no vaginal examination had been made, whose membranes ruptured spontaneously, who had a labor of fourteen hours with an opiate in the first stage and who delivered spontaneously with only the slightest perineal damage, was found to have a one-sided cervical tear four centimeters in depth. Routine inspection of a large number of cases will show that this is far from being an isolated instance.

Formerly it was taught that the cervix should not be sutured unless for hemorrhage. This was because of the fear of infection and because it was believed that the soft, puerperal cervix would not heal well. Even today the obstetric teacher may hesitate to commend too strongly to a class of students an operative procedure for fear that some of them, often in unfavorable surroundings and with limited experience, may do harm rather than good with it. But the teacher himself, with ample training, and the complete physical equipment and trained personnel of a good hospital to aid him, may do with safety and often with benefit to his patients, things which he would hesitate to recommend to his classes for use by those who command none of these things. This state of affairs is not peculiar to obstetrics, for surgical specialists in other fields may regard certain procedures in their respective fields in the same way. My argument is addressed to those who by training and physical surroundings, are able to give parturient women the best that obstetrics affords. May we not, under such conditions, lessen the amount of cervical pathology resulting from labor? And if this be possible, is it not better to prevent the occurrence of abnormal conditions if we can, than to depend entirely upon curing them after they appear?

Every writer upon the subject of cervical cancer stresses the fact that women who have borne children are more liable to the disease than nulliparae. In the opinion of Kelly and Cullen even instru-

mental dilatation of the nulliparous cervix may be looked upon as carrying with it a certain although slight predisposition to cancer. Nearly all, if indeed not all, women who bear children suffer some injury to the cervix. Only a minority of women who have had children have cancer, it is true, but many more women who have borne children have cancer than women who have never been pregnant. Farrar found in reviewing 300 cases of cancer of the cervix that 96 per cent occurred in women who had been pregnant. She reminds us that fifty years ago Emmett suggested the operation of trachelorrhaphy, and inquires whether a return to some of the principles of a previous generation might not decrease the incidence of cervical pathology, particularly cancer.

An obstetrician is a surgical specialist. The obstetrician who has an ample experience in gynecologic surgery is in better position to meet all the emergencies of obstetrics than one whose operative experience is limited to the things incident to labor. The obstetric surgeon should consider it his duty to make, after delivery, a routine inspection of the vagina and cervix. For years no one has contended against the repair of the lacerated or incised perineum. The substitution of episiotomy for laceration is but replacing a jagged and irregular wound by a clean regular incision, placed according to the surgeon's judgment and better adapted to thorough surgical repair. Proper perineal repair after labor has greatly lessened the discomfort of women due to relaxation of the pelvic floor. Why is it not equally logical to repair a cervical injury?

To ascertain the frequency of cervical laceration I have gone over the records of 975 private cases delivered during the years 1924, 1925, and 1926 by myself and my associate, Dr. C. E. Galloway. Of these, 427 are primiparae and 548 multiparae. There were 36 cesarean sections. Manual dilatation, always of the effaced and partly dilated cervix, was done 17 times. Bags were used 18 times. Excluding from this number all cases in which manual dilatation, even of the least degree was done, all cases in which a bag was used and all cases of cesarean section, we have 904 cases remaining. There are no cases of high forceps. Version was done 25 times.

For some years we have inspected routinely all cases, except multiparae who deliver spontaneously and easily, to ascertain whether any cervical damage has occurred. The cervix is examined in all primiparae regardless of the character of the delivery. We have found lacerations of the cervix of a degree which would seem to us to warrant attention in 102 cases, of which 69 were primiparae and 33 multiparae. Of these 102 lacerations, 24 were found on the right side of the cervix, 19 on the left side and 26 were bilateral. In 39 cases the record showed that a tear was found but did not indicate upon which side. In three cases there was a tear of the posterior cervical

lip. In 58 cases the tear was less than 2 cm. in extent. Of the 44 which were 2 cm. long or more, 10 were 3 cm., 2 were 4 cm. and 1 was 5 cm. in length.

While we do not attempt to assign an arbitrary dividing line based on length between those which are to be sutured and those which are not, tears of 2 centimeters or more are sutured, and those which are of less extent may or may not be according to the apparent tendency of the tear to fall together or gap.

Injury to the cervix is avoided so far as possible. The bag is used but rarely and manual dilatation is infrequent. When manual dilatation is used it is only when effacement is complete and dilatation of 5 or 6 cm. is already present. It is usually used under these conditions to assist a woman who is fatigued from a long first stage, in order that she may be gotten into the second stage before her strength is spent. It is not a frequent necessity.

Bags are used only when toxemia renders energetic measures for induction of labor necessary, or for placenta previa. Even with this conservative attitude we find that damage to the cervix during labor is a frequent occurrence.

When a tear of the cervix is found which seems extensive enough seriously to alter the shape and appearance of the cervix, it is repaired at once. There seems today no more valid surgical reason to allow a deep cervical tear to remain uncared for than to allow wounds of the face or scalp to heal as best they may without suture.

To obtain satisfactory results we have found that certain rules must be followed. Adequate exposure is, of course, essential. This requires an assistant, an instrument nurse and proper light, operating-room conditions in brief, and these are present in any well-ordered maternity. Under these conditions exposure is almost invariably easy. Traction must be evenly made on both sides of the tear. One side must not be pulled upon more than the other as the repair may be caused to be uneven and the cervical ring ultimately irregular. The best instrument for drawing down the cervix is the light cervical ring forceps of DeLee, of which two are needed.

There is a tendency for the muscle of the cervix to retract so that the mucosa of the inner and outer surfaces of the cervix project beyond it and the cross-section of the tear is "V" shaped. The suture must be passed sufficiently far from the edge that the deepest part of the "V" is included. Should only the edges of the mucosa be included the suture tends to cut through easily and the result is seldom good. One may even grasp the outer mucosa only, leaving most of the muscular layer and the inner mucosa. Interrupted sutures are best, at intervals of about one centimeter, and should be tied only tightly enough to produce apposition.

For years the only cervical tears I sutured were those from which hemorrhage occurred. All others were let alone because of the fear that infection might follow suture. As this did not occur in those in which suture was done for bleeding, it seemed fair to extend the use of sutures to a larger number of injured cervixes. The routine use of sutures in lacerated cervixes has not increased the incidence of puerperal infection. There seems to be no good reason why it should.

That this routine care of the cervix is agreed to by other men of experience is shown by the fact that in Philadelphia, the two men who for years dominated obstetric thought have both repaired the cervix, one at once, the other within a few days. Both agree, however, in not permitting the woman to return to activity without some attempt at preventing later pathology. It appeared, however, in a recent discussion that attention was more actively centered upon the healing of cervical lesions than upon their prevention.

Results have been reasonably satisfactory. It is true that in some cases a small notch will be found at the lower end of the tear a few weeks later which may allow some rolling out. Many cases heal satisfactorily and at follow-up examination show cervixes which are well closed. Because we cannot in every case attain complete perfection does not seem a valid reason for not preventing as much pathology as we can.

It is not intended to discuss the treatment of cervical lesions generally. The obstetrician's period of observation should include at least one examination six to eight weeks after labor. At this time subinvolution and misplacement will be discovered if present, and subinvolution and the condition of the cervix will be noted. Ectropion and erosion found at this time if not too extensive may be greatly improved by the use of the small electric cautery.

It is desired to emphasize the fact that pathology of the cervix may often be prevented. If it cannot be wholly prevented it may at least be lessened. In preventing or at least lessening cervical pathology we are rendering a greater service than in curing lesions of the cervix later.

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(For discussion, see page 563.)

## THE TOXICITY OF BLOOD SERUM PROTEINS IN ECLAMPSIA

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THE blood serum in eclampsia has been assumed to be more toxic than that in normal pregnancy.

The literature on this subject dates back to the work of Rummo<sup>1</sup> in 1891 who found that the toxicity of the blood serum in eclampsia was increased over that of the normal. Tarnier and Chambrelent<sup>2</sup> the following year reported an increased toxicity in blood in eclampsia of a patient. Mairet and Bose<sup>3</sup> studied the toxicity of various normal serum and concluded that 15 c.c. of normal human serum per kilo of kilo weight of rabbit was the fatal dose. Bar and Renon<sup>4</sup> also found an increase in the toxicity of blood serum in eclampsia. Ludwig and Savor<sup>5</sup> came to the same conclusions. Volhard<sup>6</sup> in 1897 concluded that there was no difference in the toxicity of the serum in normal and eclamptic individuals. Schumacher<sup>7</sup> supported Volhard's conclusions. Semb<sup>8</sup> in order to get rid of the toxicity of normal serum immunized his animals and found that after immunization the serum in eclampsia usually produced fatal results. The work of Dreyfuss<sup>9</sup> with relation to the toxicity of the serum was too limited to form the basis of any conclusions. Graf and Landsteiner<sup>10</sup> found that 13 out of 19 cases of eclampsia showed increased toxicity of the serum. They believed this to be merely an increase in the amount of the normally present toxic substances. Gessner<sup>11</sup> in 1920 on the basis of the changes that he observed in the kidney claims that they present a picture rather of undernourishment than that of the action of toxin. Bumm<sup>12</sup> by transfusion experiments in which he reached quantities as high as one litre, injecting the blood of an eclamptic patient into a normal patient without producing any effects concludes that there is no toxin in the blood of eclamptics. In a discussion of his work he admits that his results might be explained in a different way. Levy-Solal and Tzanek<sup>13</sup> again find that intracardiac injection of serum from eclamptic patients shows a greater toxicity than that from normal pregnancy.

No effort has been made to separate the fractions of proteins and study the different fractions. It seemed to us that it would be interesting to make an observation of the toxicity of the proteins from normal serum and from the serum of eclamptic patients.

### EXPERIMENTAL

The blood used in this study was obtained from two eclamptic patients (intrapartum and postpartum) whose histories follow:

Patient M. B. was received in the Cook County Hospital on January 28, 1925, in a comatose condition. The history was given by the mother. Pains in the "stomach" had been present for two days. Headache began two weeks previously and had become so severe as to prevent sleep and cause vomiting. The amount of urination had decreased. No edema had been observed. She had three convulsions before entering the hospital. Her past history contained nothing of interest.



Physical examination revealed a well-developed, well-nourished colored girl, fifteen years of age, in coma. The essential findings were, dilated pupils, blood pressure of 202/115, a full term contracting pregnant uterus with a live child and dilated cervix. After the routine eclamptic treatment and the delivery of the child, the patient continued to have convulsions, eight in succession, after which she became quiet and slowly her condition improved. The urinalysis showed four-plus albumin, casts, white and red blood cells. The blood chemistry showed no retention. The Wassermann test was negative. The patient recovered and on February 9, 1925, was discharged having a blood pressure of 124/88 and normal urinary findings.

The second patient, C. H., entered Cook County Hospital on January 27, 1925, in labor and delivered a premature child. She had had two full-term spontaneous deliveries and three spontaneous miscarriages. She had had measles, mumps, chicken-pox, malaria and influenza. Physical examination negative. The following day she complained of headache and vomited. Her blood pressure was 225/135. The following day she had several convulsions and in spite of the usual therapeutic measures, she died. No autopsy was permitted. Urinalysis showed albuminuria four plus and casts. Blood chemistry showed only a uric acid retention of 4.50 mg. per 100 c.c. of blood.

*Technic.*—This fractionation was carried out according to the method outlined by Hektoen and Welker.<sup>14</sup>

The blood serum proteins were dissolved in normal saline solution so that one cubic centimeter of the solution represented 25 mg. of the protein. The solution was injected intraperitoneally into white mice, weighing 18 to 20 gm. The initial dose was small and larger doses were given to separate mice. Three cubic centimeters was usually the maximum amount of fluid tolerated by the mice intraperitoneally. When this limit was reached a solution of 50 and then 75 mg. to the cubic centimeter was used. Euglobulin could not be tested because it was only soluble in 10 per cent saline solution which in itself was toxic because of its hypertonicity.

The results are given in Table I.

TABLE I. TOXICITY OF BLOOD SERUM PROTEINS  
(Injected intraperitoneally in mice)

	ALBUMIN	PSEUDOGLOBULIN	46-64	EUGLOBULIN*
Normal Serum	75.0 mg.	225.0 mg.	225.0 mg.	—
Serum 500†	62.5 mg. 75.0 mg.	300.0 mg.	No specimen	—
Serum 501‡	No specimen	150.0 mg.	225.0 mg.	—

\*Three-tenths cubic centimeters of 10 per cent sodium chloride solution caused death when injected intraperitoneally into a 20 gm. mouse. Since this is the solvent used for euglobulin, no toxicity experiments were made on this protein.

†Serum 500 obtained from patient with intrapartum eclampsia.

‡Serum 501 obtained from patient with postpartum eclampsia.

None of the blood serum proteins proved toxic in the experiments except the albumin of serum 500. In one mouse, 62.5 mg. were lethal while in repeated experiments 75.0 mg. were nontoxic.

The amount of protein injected represents roughly the equivalent of  $1\frac{1}{4}$  to  $1\frac{1}{2}$  c.c. of blood serum in the case of the albumin and 14 to 17 c.c. in the case of the pseudoglobulin.



## CONCLUSIONS

The blood serum proteins of normal and eclamptic women's blood showed no experimental evidence of toxicity in mice although injected in large doses intraperitoneally.

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## CORPUS LUTEUM HEMATOMA

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THE term, "corpus luteum hematoma," designates excessive hemorrhage localized in the central cavity of a lutein body. This pathologic bleeding is an accentuation of hemorrhage occurring normally during the development and involution of the corpus luteum. As first demonstrated by Sobatta and later confirmed by Honore, Frankel, and Schroeder, rupture of the graafian follicle is not associated with bleeding into the central cavity. The developing lutein body is, therefore, free from blood in its early congestion stage. Personal observation in fourteen cases in the human ovary has confirmed this finding. Early in the vascularization stage, blood, however, makes its appearance in the central cavity of the corpus luteum. In a study of fifty ovaries with lutein bodies in this stage, the bleeding can be traced from the congested capillaries in the theca externa through the lutein column which it dissociates into the central lutein cavity. Along these avenues blood vessels and fibrous septa appear somewhat later. Grossly this hemorrhage is prominent. It produces a narrow circumscribed zone of blood, 0.5 to 2 mm. in thickness and in immediate contact with the lutein column. During the stage of efflorescence of the corpus, the hemorrhagic zone is slightly less prominent, due to hemolysis. Fresh bleeding, however, does not occur.

With the death of the ovum liberated during previous follicular rupture, lutein involution begins. In a study of six regressing corpora removed from the fourth to the eighth day in the menstrual

cycle, involution was found associated with additional bleeding into the central cavity. In half the cases the entire central cavity was compactly filled but the latter was irregular and contracted. In the remainder, slight to moderate quantities of fresh blood could be traced into the central cavity. This proceeds from the congested capillaries in the inner fibrous core and in the lutein column. Even in involuting corpora of the fatty and hyaline stages, additional recent hemorrhage can be traced from the persisting capillaries. This is in keeping with the findings of Schroeder, Marcotty and Aschoff, who noted recurrent bleeding in regressing corpora lutea with each subsequent menstruation. This persists until capillaries have been finally obliterated in the corpus albicans stage. It will be seen, therefore, that physiologic bleeding occurs into the central cavity of the corpus during early vascularization and initial regression stages. The lutein hematoma results from accentuation of this bleeding.

In the study of 32 cases here presented, corpora lutea were considered hematomas when half or more of the central cavity was filled with blood, thus allowing amply for variation within the normal. In the involuting group of corpora, the enlarged and dilated and blood-containing cavity formed the chief criterion of excessive central bleeding.

During operation the gross appearance of unsectioned ovaries, the seat of lutein hematomas is frequently obscured by the dense adhesive bands fixing the organs to the uterus or broad ligament. In their removal many are consequently so mutilated that they are unfit for proper detailed study. As a rule the ovaries are moderately enlarged, averaging 5 by 3 by 2.5 cm. When the hematoma is of unusually large size or when multiple ones are closely set, the reflected blue-black color of the organ is suggestive. After section, however, the appearance is typical. Multiple or solitary, sharply defined blood collections lie in the cortex and medulla. The largest hematomas may occupy the entire organ (Fig. 1); the smallest functioning lutein hematomas equal that of a normal "corpus luteum" (1.5 to 2 cm.). The majority, however, are moderately larger and average from 2 to 3 cm. in size (Fig. 2). In the regression stage they average from 10 to 15 mm. and are larger than corpora in the similar regressive phase. The boundary of the central hemorrhagic zone is formed by a lutein layer which varies in thickness with the extent of bleeding. In the largest the epithelial column is barely grossly recognizable, and convolution is reduced if not entirely lacking. In the recent hematoma the grey-brown lutein layer contrasts strikingly with the bright red hemorrhagic center; in older regressing forms the lipoid laden cells transmit a canary-yellow color contrasting with the brown central zone and its partially reduced blood. In the oldest the blood is blue-black and frequently liquified so that on section tarry or chocolate fluid escapes from the cavity. In these, the limiting membrane is formed by a wall of fibrous tissue. Intrafollicular hemorrhage is frequently associated, and the reflection of blood through the thin cyst wall is grossly striking. Interstitial bleeding is occasionally met and is generally adjacent to the follicular or lutein hematomas. The general engorgement of the organ imparts a pinkish hue to the grey stroma.

The distribution of the hematoma in the cases studied was as follows: In twelve cases the hematomas were bilateral, in four only one side was involved. In the

remaining sixteen cases only one ovary was available for study, thus allowing no interpretation. Multiple hematomas in the same ovary occurred in eight cases and varied from 2 to 3 in number.

Microscopically the features of hematomas vary with the size and age of the corpus luteum. The persistence of their physiologic function is gauged in the more recent hematomas by the cyclic change of the uterine mucosa and further checked by the menstrual date. The presence of recent and old hematomas in the same organ indicates a recurrent process. It must be emphasized, however, that normal corpora in the congestion, vascularization, and regression phases were encountered in ovaries, the seat of older lutein hematomas.

Hematomas in corpora lutea of vascularization were noted in six cases. In all, the lutein layers were reduced in number. The individual lutein cell, however, is only slightly altered. Between the cell column course engorged capillaries. Interstitial bleeding could be traced through the lutein column into the central cavity. As shown in Fig. 3, the hemorrhage is occasionally so intense that lutein cells are



Fig 1.—External view of ovary, the seat of a large corpus luteum hematoma. The organ is almost completely filled. The lutein layer is flattened, and all convolutions have disappeared.

detached and lie in a necrotic state mingled with the red cells of the central cavity. In four cases the latter was compactly filled with blood. In the two largest the inner zone of the central cavity was filled with fine fibrinous coagulum. The outer half of the cavity, adjacent to the lutein column, was compactly filled with preserved red blood corpuscles. These represent cystic corpora lutea in the vascularization phase with excessive bleeding. Several albicans cysts in the same ovaries indicate repeated formation of these cystic corpora. The theca-interna cells were normal for this developmental stage of the corpus. In three of the cases the endometrium was available and presented typical cyclic changes of the early premenstrual mucosa. Function, therefore, was retained in the corpus; the bleeding was not sufficient to produce complete pressure atrophy of the lutein column.

Hematomas in corpora lutea of efflorescence were present in five cases. In these, a central fibrous band separated the central blood-filled cavity from the lutein layer (Fig. 4). In one of the cases the hematomas occupied the entire ovary and measured

4.5 by 4 by 3 cm. The lutein column was barely recognizable, being flattened and free from convolutions. The regular central cavity was compactly filled with well-defined and normal red blood cells. The adjoining fibrous band was well organized and held capillaries. The lutein column was comprised of only from four to six cell layers, compressed and reduced in size. Between them the contracted capillaries with associated fibroblasts traversed the entire column. No theca-interna cells were present. The remaining cases present hematomas varying from 2 to 2.5 cm. in size. The lutein column was greyish-yellow, thin, and defined. The dilated central cavity was filled with normal red blood cells, and in all was separated from the lutein column by a well-defined fibrous ring as typical of a normal corpus in efflorescence. The lutein layers were moderately reduced and averaged from 12 to

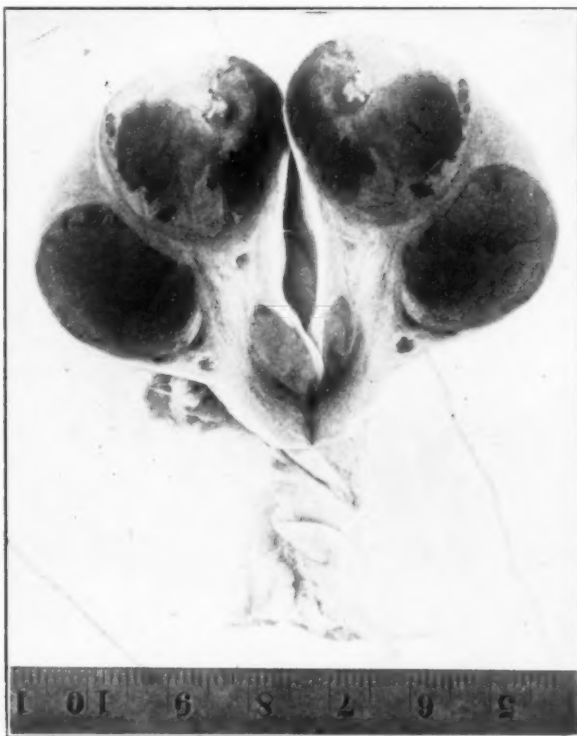


Fig. 2.—Multiple lutein hematomas of the ovary. The lutein layer is barely recognizable; the cavities are dilated and compactly filled with blood.

15 in number. The cells, however, were normal, and the capillaries were free from change. Excessive bleeding had evidently occurred in the preceding vascularization phase, for the capillaries in the lutein column and in the inner fibrous core were contracted. The endometrium available in two cases displayed typical late premenstrual changes.

Hematomas of regressing corpora lutea were found in twenty-one cases. This was to be expected, for the regressing stage of corpus luteum is normally protracted over a period of several months. An important question suggests itself at once. Are these regressing forms the end-stages of hematomas arising during vascularization, or do they represent hematomas originating during the early involution of a normal corpus luteum as the result of excessive bleeding at this time? The state of organization of the central cavity in a large measure decides the



Fig. 3.—(x 120) Corpus luteum hematoma in the vascularization stage. Bleeding has detached some of the lutein layers which lie in the central cavity, surrounded by a broad hemorrhagic zone.

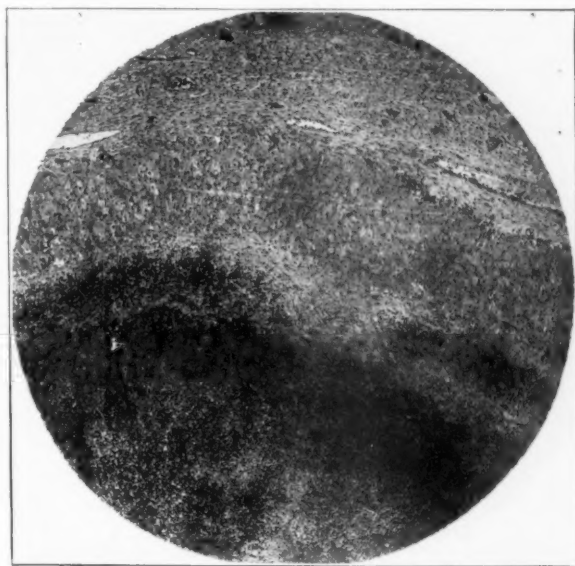


Fig. 4.—(x 120) Corpus luteum hematoma in stage of efflorescence. The lutein layer is preserved, and a wide fibrous band separates the blood-filled cavity from the lutein column.

question. If a central fibrous band or irregular fibrous zone is lacking in the central cavity even at this stage, thus permitting direct contact of blood with the lutein cells, it is reasonable to assume that excessive bleeding interfered with organization, and the hematoma, therefore, developed prior to involution of the corpus.

The larger size of these forms and the wide central cavity lends weight to this view. Crenation, fragmentation, and hemolysis of the red cells are of no aid in differentiating early or late organization, for erythrocytes of the early vascularization would still be preserved during early involution. It aided, however, in the demonstration of recurrent bleeding in lutein hematomas when preserved red cells were found intermingled with older disintegrating erythrocytes.

Unorganized regressing hematomas comprised nine of twenty-one cases. Their size and structure varied with the degree of regression from ten to fourteen millimeters in size. In all the central cavity is wide and dilated. The blood cells were well preserved and in direct contact with the fatty or hyaline lutein column. No intermediary fibrous zone was present. In the two oldest, large clusters of hemosiderin laden phagocytes were encountered. Only on repeated section was a narrow rim of hyalinized lutein found to indicate the origin of the hematomas.

The remaining twelve hematomas show evidence of central organization (Fig. 5). In the largest two, a narrow fibrous core of hyalinized stroma intervened be-

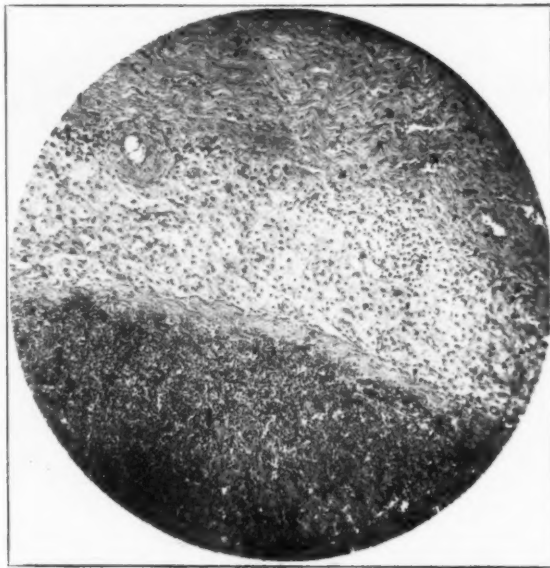


Fig. 5.—(x 120) Hematoma of regressing corpus luteum. The central cavity is compactly filled with blood. A narrow hyaline fibrous layer is in contact with the fatty lutein cells.

tween the central hematoma and the lutein column which presents the picture of incipient regression. Blood could be traced from the capillaries of the central fibrous zone into the cavity. Yet this was hardly sufficient to account for the excessive hemorrhage in these large hematomas. They were accordingly interpreted as hematomas of the vascularization stage with insufficient central pressure to prevent organization of the corpus in its functional state. Additional mild bleeding occurred during involution. The remaining ten hematomas were older. The central cavity contained hemolized blood, and a broad zone of concentric fibroblasts immediately encapsulated the hemorrhage. Numerous mononuclear cells gave evidence of continued organization and the large numbers of pigment laden phagocytes between the fibroblasts indicate considerable duration of the hematomas. In only three did repeated section successfully demonstrate narrow segments of fatty or hyalinized lutein cells, indicating the nature of the hematomas. In the remainder, the blood was in direct contact with a wide zone of fatty collapsed lutein cells.



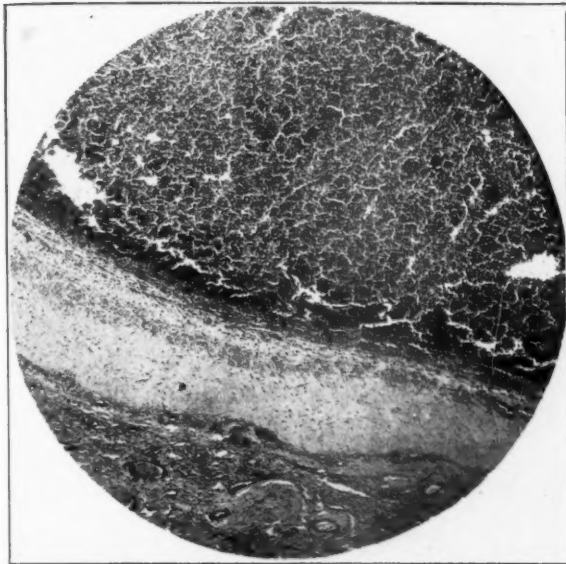


Fig. 6.—(x 120) Hematoma of corpus albicans. The central cavity is unorganized and filled with blood. The lutein column shows typical hyaline change.

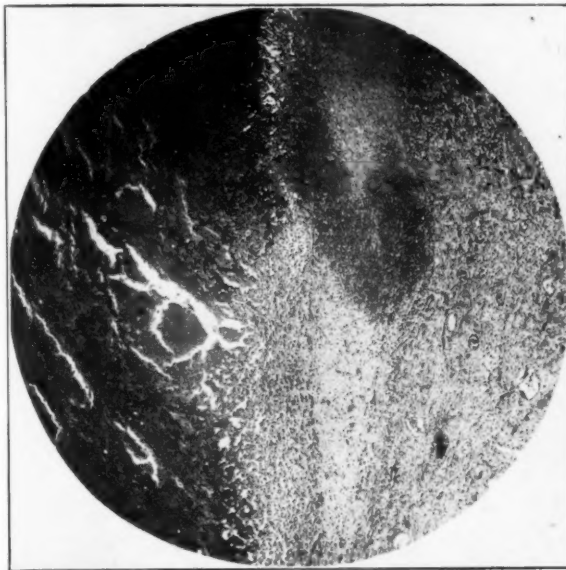


Fig. 7.—(x 120) Hematoma in a corpus luteum of advanced regression. The central cavity holds hemolyzed and preserved red cells. The surrounding fibrous layer is filled with hemosiderin laden phagocytes. The recent recurrent hemorrhage proceeds from the capillaries in the fibrous zone.

The time of occurrence of the extensive bleeding in these hematomas is difficult to interpret. The impression is that of hematomas arising during vascularization with recurrence of additional bleeding in the later phases of regression.

Vascular hyperemia of the ovary was the underlying factor of the excessive

bleeding, as shown by the associated pelvic pathology. In the thirty-two cases of hematomas twenty-seven displayed pelvic peritonitis dependent upon salpingitis; one of these was tuberculous in origin. Three cases were associated with fibroids of the uterus. Static factors are indicated by two instances with retroflexion and prolapse of the ovaries. The pathologic effusion into the corpora lutea during vascularization is the result of extensive congestion of the ovarian capillaries. Rupture of such thecal vessels in early vascularization liberates an excessive quantity of blood. The mechanism of the physiologic and pathologic bleeding is therefore the same. The time of origin is most frequently in the interval of the cycle. The origin of hematomas during regression is difficult to prove from the material studied, but recurrent bleeding undoubtedly occurs in this phase.

The symptoms of corpus luteum hematomas are difficult to interpret as to cause and effect, because of the frequency of salpingitis and peritonitis associated with the ovarian lesions. Fibroids and retroflexion also obscure the clinical interpretation. Of thirty-two cases, twenty-three had menorrhagia and three, metrorrhagia. The remainder showed no menstrual anomaly. Submucous fibroids easily accounted for the symptoms in two of the cases. The second most common symptom was menstrual pain and was noted by twenty-four patients. In two this was acute in its onset and began ten to twelve days before the last period preceding surgical removal of the organ. The ovary showed a huge solitary hematoma of vascularization in each case. The majority, however, had dull pain in both lower quadrants, beginning three to four days prior to menstruation and continuing for from one to two days of the period. In three cases pain persisted throughout the menses and these ovaries presented multiple hematoma.

#### CONCLUSIONS

1. Rupture of the graafian follicle is not associated with bleeding into the follicular cavity.
2. The normal corpus luteum shows moderate central bleeding into its cavity during the vascularization stage. Grossly it appears as a narrow zone in contact with the lutein columns.
3. Secondary bleeding follows with beginning involution and, hence, is associated with menstruation. Recurrent bleeding into regressing corpora follows with every subsequent menstruation until the corpus is transformed into an avascular corpus albicans.
4. The corpus luteum hematoma differs from the normal corpus hemorrhage in the excessive quantity of bleeding into the cavity of the corpus. Half or more of the cavity is compactly filled with blood.
5. Excessive bleeding is the result of pathologic hyperemia of the ovaries, dependent upon salpingitis, fibroids, or displacement.
6. The integrity of the lutein column and the function of the lutein hematoma vary inversely with the quantity of the bleeding. Functioning hematomas with corresponding cyclic change in the endometrium have been noted in the vascularization and efflorescence phases. Regressing corpora lutea, however, comprise the majority of hematomas because of the normal prolongation of this stage.
7. Hematomas in regressing corpora lutea represent in many in-

stances the involution stage of hematoma of vascularization; additional bleeding has occurred during involution.

8. In the most advanced hematomas the lutein phase at the time of origin cannot be fully determined.

I extend thanks to Drs. John O. Polak and Archibald Murray for their suggestions in the preparation of this paper, and to Dr. J. V. Dunn for his excellent photographs.

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1530 PRESIDENT STREET.

## A CASE OF FIBROADENOMA OF THE BREAST

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REPORT OF PATHOLOGIC SPECIMEN BY PHILIP HILLKOWITZ, M.D.  
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**M**AMMARY hypertrophy as found in adolescence and adult life is described in textbooks as one of the anomalies of the breast. It means a uniform diffuse growth of the organ, both as to the parenchyma and the stroma in the same proportion as in the normal breast. The case here presented, however, is one in which there was true tumor formation, and on account of its rarity is, therefore, deemed worthy of record.

The young girl here pictured (Fig. 1) lacked ten days of being fourteen years of age when the breasts were removed on January 6, 1927. Breast development had been noticed by her mother in April or May and up to the first part of November, "they were but little larger than breasts commonly observed in girls of her age." Rapid growth then began, so that their present large size was attained in approximately three months.

A few days before she was brought in for examination, the skin on the anterior surface of the left breast had broken, keeping up such a continued leakage of serum that the child's clothes were constantly wet. This complication accompanied by the feeling of shame from her deformity had determined the decision for operation. There was discomfort and fatigue from the weight of the breasts but no pain.

The physical examination was normal but for an undernourished condition and the extreme size of both breasts; these were pyriform in shape, the left a little larger than the right, and both reaching down to slightly above the symphysis pubis. They were smooth, tense, and of uniform consistency. There was a slight growth of pubic hair. No pelvic examination was made because of the child's extreme sensitiveness; she had not yet menstruated.

The present case was thought to be one of simple hypertrophy until after removal, when cross-sections of the breasts showed many lobulated tumors; these on microscopic examination proved to be multiple fibroadenomata. The description of the breasts after removal is as follows:

The right breast weighed 15 pounds (7 kilograms); the left, 12 pounds (5.5 kilograms). The overlying skin was smooth and tense, no nodular elevations being seen on the outside. The consistency was somewhat fluctuating. On section the tissues were quite edematous. A considerable number of nodules of various sizes, surrounded by a capsule, was seen in each breast (Fig. 2).

Examination of the sections (Fig. 3) revealed a stroma of fibrous connective tissue in which were acini lined by two layers of cuboidal epithelium, in place of columnar. Some of the acini were dilated and filled with a granular or hyaline material.

As to the relative proportions of the parenchyma and stroma the fibrous elements made up the larger share. On account of the edema the fiber bundles were separated by hollow spaces. There was a fairly abundant network of capillaries. In places the acini showed branchings and shallow indentations.

#### DISCUSSION

The presence of distinct nodules and the gross and microscopic differences from the appearance of normal nonlactating breast tissue classifies this specimen as a fibroadenoma. The absence of areas of adipose tissue would also add strength to this diagnosis. The microscopic appearance, it is true, differs from the usual picture of the intracanalicular and pericanalicular fibroadenomas seen in adult life, where the stroma is relatively more abundant and exerts pressure on the acini. Nevertheless we are dealing here with a true neoplasm, as the nodules are independent structures and have apparently no functional relation to the normal breast, the ducts being shut off from the rest of the organ.

As to the etiology of fibroadenomas, the same unknown cause or causes operate as in the formation of tumors in general. The theory of latent rest in such cases is rather alluring. Some small portion of the original organ in the early state of its evolution is separated from its fellows and later grows independently. Both the epithelium and the stroma with its vessels must be involved in order to make up eventually the neoplasm with its fibrous and epithelial elements.

The patient menstruated for the first time one month after the operation and continued regularly; she picked up rapidly in health and gained sixteen pounds in two months.

Considering different types of enlargement of the breasts, one commonly sees in the newborn infant, either male or female, a temporary hypertrophy accompanied by a secretion of milk. This development

in the infant is explained by the presence in its circulation of the same substance or substances that produce breast hypertrophy and secretion in the mother.

Though rare, there are also many instances of infantile hypertrophy, which are rather a manifestation of precocious sexual development than of a localized disturbance of the breasts. In many cases these are due to a disease of the suprarenal glands, hypernephroma, or benign tumors of the suprarenals.

Lebeau reports the case of a baby girl who at birth had a hairy mons veneris and well-developed breasts and began to menstruate in



Fig. 1.—Shows the enormous enlargement of both breasts which reach almost to the pubes.

her third year. There are even more remarkable cases of which Deaver and McFarland have several references.

There is no parallelism between these cases of precocious development and those of simple massive hypertrophy in which the breasts are distinctly abnormal. Frank has shown that when once established, ovulation and genital hypertrophy persist; what causes the initial stimulus is still a question.

The description of the breast in massive hypertrophy has been aptly given as showing nothing abnormal excepting the size. In this con-

dition of simple hypertrophy there is a hypertrophic increase in both the glandular parenchyma and interglandular stroma, the preponderance being in favor of the latter. In some instances the parenchyma tubules are dilated and lined by cuboidal cells. Albert has found a diminution of elastic tissue. In a few there has been a preponderance of fat. Guthrie and Albert suggest that this is a different process from hypertrophy, and call it adiposity.

In cases of simple or massive hypertrophy the histories are very similar, a young girl before or at the beginning of menstruation observes one or both breasts commencing to enlarge. Instead of

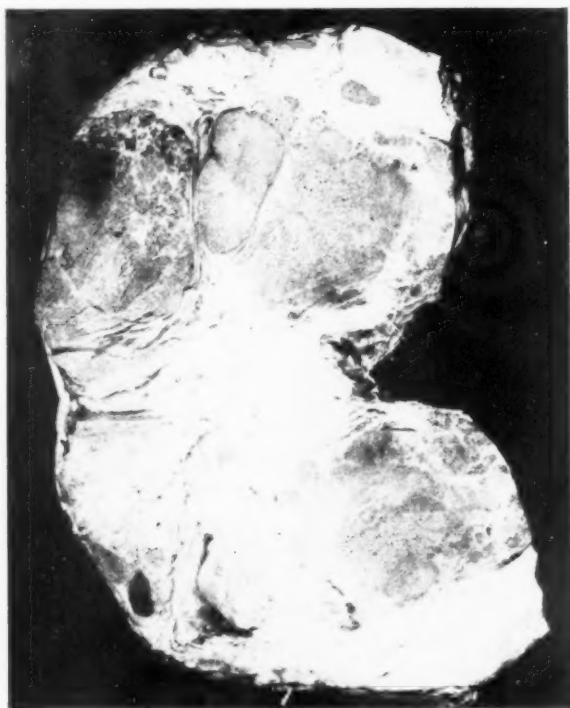


Fig. 2.—Cross section of breast showing distinct nodules situated in the mammary tissue.

ceasing when normal growth is reached, one or both continue to grow until so large that the child is embarrassed by their size, or the weight becomes so great that walking is interfered with. Discomfort and fatigue are common complaints; in comparatively few is real pain a factor. The enlargement may occur at any time from puberty to the menopause. Deaver and McFarland state that about one-half of the cases reported have occurred prior to the eighteenth, the majority of these around the sixteenth year. The average maximum growth period in the young is twenty months, while in those over twenty-one, it is around five years. The rate varies, however, and there are in-



stances of very large growths in a few months. Zurakoff's patient's breasts reached a circumference of 57 and 58 cm. in two and one-half months.

The size of the breasts may be tremendous. The most remarkable case was reported by Durston in which the left breast weighed sixty-four pounds, the right forty.

In 182 cases in which details were given, the hypertrophy affected both breasts in 142, one breast in 40.

Secretory activity in cases of hypertrophy is variable. Freund's patient, with a tremendous pregnancy enlargement of the breast, failed to lactate, while cases reported by others showed good secretion of milk following pregnancy hypertrophy. Ehrenhaus reported an

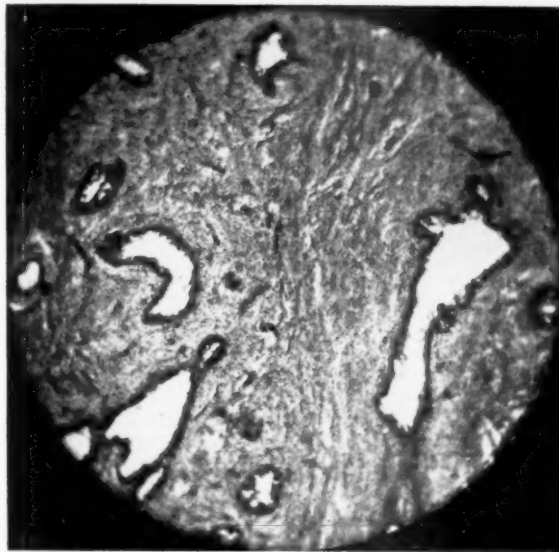


Fig. 3.—Microscopic section of nodule showing acini lined by epithellum in a stroma of connective tissue.

instance of hypertrophy in a nonpregnant multipara with as much as a quart of milk a day. There does not seem to be any relation between the size of the breasts and the amount of secretion.

The general tendency for massive hypertrophy is to undergo retrogression. This is especially true in those women who bear children. There are many cases reported of spontaneous regression to normal or almost normal size. This is shown in individuals who refuse operation, or in some from whom the larger breast has been removed, when after an interval of about a month the other diminished to such an extent as to indicate recovery. A knowledge of this experience leads to a conservative attitude and gives the patient who is not actually suffering from her discomfort, a chance of recovery without surgery. In those in whom the breasts are so large and heavy as to interfere

with work or walking, or who are made conspicuous and sensitive by their great size, the breasts may be removed. The existence of pregnancy is not a contraindication. Deaver and McFarland speak of four cases in which the operation was performed at this time without interruption of gestation.

The operation is easily and quickly done, there is no question of malignancy and suitable plastic flaps may be obtained from the large breasts and an uninterrupted recovery should follow.

Regarding the etiology of massive hypertrophy, heredity is mentioned as a factor in three cases. Pflanz's patient, thirty years of age, had a mother who at one time had a greatly enlarged breast and a brother with a gynecomastia. Cubet's patient, twelve and a half years old, had a massive hypertrophy requiring removal of the breasts. Her mother had had at the same age, the same condition, but in her case the breasts had spontaneously returned to normal. The third instance is reported by Englander in which the breasts of an adult woman were so large that the circumference of the right was 52 cm., of the left 46 cm. This patient's mother had a right breast twice as large as the left.

Velpeau reported a case in which trauma, an unimportant blow with the elbow, was supposed to be the inciting cause. Heredity and trauma are probably unimportant factors.

The cause of the enlargement is naturally one for speculation, though practically all are agreed that an endocrine disturbance associated with the organs of reproduction is the exciting agent; against this idea is the fact that in about one-fifth of the cases, only one breast is affected. This observation seems to be outweighed, however, by the fact that in instances of polymastia the accessory breasts share in the enlargement.

As the production of massive hypertrophy is considered one of endocrine disturbance, it might not be out of place to consider here the process of enlargement of the breast at puberty and during pregnancy, and the formation of milk.

That there is an interrelationship between the breasts and the genital tract has long been known. From birth, the ovaries undoubtedly elaborate a small quantity of female sex hormone, but not in sufficient quantity to exert trophic influences on the immature sex organs. The first ovulation marks the onset of puberty, the ovaries, tubes, uterus, vagina, vulva, and breasts becoming enlarged. With other body changes this hypertrophy ceases within normal limits. There is a recognized relationship between the ovaries and other organs, principally the hypophysis and the adrenal glands, but the influence of one gland on the other is far from being thoroughly understood.

From the few observations made in the human race, it is seen that early castration is followed by lack of development of secondary sex-

ual characteristics, including the breasts. Just before each menstruation some stimulus reaches the breasts which is now thought to come from the corpus luteum. During pregnancy at which time the yellow body is larger and persists, the breasts take on rapid changes with considerable growth.

Herrman demonstrated that a lipoid isolated by him from the corpus luteum, biologically and chemically, was identical with a lipoid extracted in the same manner from the fresh placenta, and the most characteristic effect he obtained from the lipoid extracts was a stimulation of the breasts, even in newborn animals. Frank has recently shown that the endocrine substance is identical in the corpus luteum, graafian follicle, and the placenta. Whether or not the latter organ actually produces this chemical or simply stores it in large quantities, is still a matter of speculation.

With the increased stimulation from these substances, the breast is prepared for secretion, though lactation does not follow until a short time after the birth of the child. Involution of the uterus was once thought to originate the process; its independence of the uterus is shown by the fact that a Porro-cesarean section does not prevent it; that it is not initiated by the expulsion of the fetus is shown by lactation following an hydatidiform mole or dead child. Castration does not prevent lactation; indeed, animal breeders castrate for the purpose of prolonging the supply of milk. It is also independent of nerve supply, as shown by successful transplantation of breasts in animals; furthermore, in human beings lactation results after a complete transverse lesion of the spinal cord.

That hypertrophy is dependent on a hormone is demonstrated by enlargement of the breasts and by lactation in parabiotic animals and in the pygopagic sisters studied in Vienna. (Frankl.)

Halban first claimed that it is due directly to the loss of the placenta that colostrum is changed to milk. Frankl then successfully transplanted placentas into pregnant rats, preventing milk formation; the young rats died of starvation. The transplanted placental growths lived about four weeks and when the same rats became pregnant again, they were able to nurse their young.

A retained placental remnant in the human being has been shown to prevent milk secretion. Stimson reported an example of a patient who had lactated normally with eight previous children, then had a retained piece of placenta, with no milk in the breasts for ten days, when suddenly, with the expulsion of this piece of tissue which was about the size of a lemon, lactation was established.

We have, then, in the placenta a substance which, like corpus luteum, stimulates the mammae for the production of secretion but at the same time inhibits actual milk secretion. Frank states that corpus luteum substance and placental extract (identical substances) stimu-

late the breasts to enlargement, but milk secretion does not follow until they are eliminated by expulsion of the placenta and regression of the corpus luteum.

Whether one internal secretion regulates all breast activities is problematical, and indeed, hypertrophy and even lactation in the human being must be accounted for by some hormone other than that of the corpus luteum. There are instances on record where old women or children before maturity, have taken babies and from the stimulation of nursing, produced milk in sufficient quantities to supply the infant.

Muchanoff has reported a case of bilateral enormous fibroadenoma of the breasts; our case is undoubtedly similar to his. Besides the conditions mentioned, there are cases reported of large breasts due to the presence of intramammary lipoma, and a few instances of true elephantiasis.

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509 REPUBLIC BUILDING.

### SOME DISORDERS OF THE FEMALE SEXUAL FUNCTION OF MENTAL ORIGIN

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THERE are certain disorders of the sexual function in women which arise independently of any organic disease of the organs concerned. These are classed as neurotic disturbances and include amenorrhea, dysmenorrhea, vaginismus, vaginal anesthesia, the vomiting of pregnancy, and possibly some cases of abortion. They may arise independently of any organic disease which can be demonstrated. Textbooks on gynecology refer to these conditions as neurotic, and in the case of menstrual disorders speak as if the disorder is the cause of the neurotic state. Thus, Eden and Lockyer (*The New System of Gynecology*) say, "When normal menstruation causes neuroses, it is our experience that the neuropathic condition is cyclical and only exists in

relation to menstruation. Or again Graves (*Gynecology*, ed. 2, 1918) says, "Of the menstrual irregularities that may produce neuroses, dysmenorrhea is by far the most important."

This, however, is to put the cart before the horse. The modern approach to neurotic conditions, which has been made possible by Freud's technic of psychoanalysis, shows quite clearly that these neurotic disorders of the sexual function in women are really only symptoms in much more widespread mental states which in modern terminology are classified as the psychoneuroses (anxiety hysteria, conversion hysteria, obsessional neurosis). These conditions produce effects which arise from certain mechanisms taking place in the mind, which it will be necessary to discuss briefly in order to understand the way in which the symptoms originate.

Since the patient in whom these symptoms occur is not aware of any connection between the symptom and anything that is going on in the mind, the mechanism at work is unconscious.

It follows, therefore, that any approach to an understanding of these conditions must be made through the mind of the patient, and furthermore that any attempt to do so which does not take into consideration the question of unconscious mental functioning is doomed to failure.

Freud's elaboration of the already existing idea of the unconscious has thrown a great deal of light on these conditions. In order to understand them properly, it is necessary to explain some of the fundamental principles involved in the theory of the unconscious. The disorders which have been mentioned are symptoms of a more widespread psychoneurosis. Every psychoneurosis arises as a result of a conflict in the mind of which the person is not aware, that is, unconscious. The conflict arises in the following way: certain ideas which have been repressed become, as a result, unconscious, i.e., the person is no longer aware of them. As these repressed ideas take the form of wishes, they possess a dynamic energy with a constant urge toward consciousness, with the object of finding gratification.

The constant tendency of wishes which have been repressed to force themselves into consciousness again meets with just as constant opposition on the part of the moral and esthetic forces at work in the mind, which are responsible for the repression.

The conflict begins in earliest childhood when the moral and esthetic faculties are beginning to develop. The wishes which have been repressed are of such a nature as to be incompatible with the moral and esthetic faculties. These wishes are mostly connected with the instincts, the sexual instinct being the chief one that is subject to repression. During the first four or five years of life, the child builds many phantasies around its wishes connected with the instincts, a common one of the little girl being the wish that her father should



give her a baby like the one he gave her mother. These phantasies, which are numerous, become repressed for the reasons given.

There is, however, a particular wish from which the little girl develops many phantasies, which is of special importance in this connection. It is a wish which may lead to the repudiation of womanhood later, with all its serious consequences. The wish originates in the following way. Up to a certain period the little child makes no distinction in its mind between the sexes, anatomically. Owing to lack of knowledge on the subject, the little girl does not conceive of the possibility of any others being different from herself. At some period in early life (first two or three years) she makes the discovery that some people possess an organ (the penis) which she herself lacks. This discovery, usually made in connection with her father, her brother, or some other little boy, has the effect of producing a psychological trauma of varying intensity. She wonders what has happened to herself, and comes to the conclusion that either this organ has been taken away from her, or else it has not grown yet, but will later.

It is a shock, producing various reactions. Children hate to feel that they have been unjustly treated, and in the nursery claim equal treatment for all; for instance, some children exhibit jealousy when a brother or a sister is given a bigger helping of some sweet they like. Envy is then a prominent reaction. The little girl, feeling that she has been deprived of something, tends to become hostile to the more fortunate possessor, and to develop revengeful feelings toward him, with impulses to take the organ away. In this case she accepts the situation but is revengeful. In another she may not do so, but may blind herself to the absence of the penis and create the phantasy of possessing one, thus satisfying her desire to be equal to the man (father, brother) in her imagination. These phantasies become repressed for the reasons already given.

It is a characteristic of repressed wishes, however, that they remain unchanged in the unconscious mind indefinitely. Also, in spite of the fact that they cannot enter consciousness in their original form, they are potent for influencing the individual's behavior, without her knowing that it is being influenced by anything. Hence, we find that the most serious effect of the phantasies connected with this traumatic experience is the repudiation of womanhood.

This repudiation of womanhood may be so strong as to lead to a psychoneurosis of which one of the disorders of the sexual function mentioned may be a symptom. The repudiation of womanhood is for the most part an unconscious process. We find women who repudiate it entirely by adopting openly a masculine attitude toward life. For the most part, however, this repudiation is only partial, so that we meet women who outwardly appear feminine but who nevertheless possess strong masculine desires of which they are not conscious, but



which are clearly seen in their characterology when looked for. Such women are usually envious of men. They feel that men have an advantage over them. They are usually hostile to men, try to disappoint them, and are strong supporters of women's rights movements. Their marriages are frequently not successful; they cannot give themselves up fully to occupy the feminine rôle, either in the sexual act, or in their general relationships with their husbands. Although they would like to love, they feel an incapacity to do so, because their positive love feelings become immediately counterbalanced by the hostile feelings which spring from the unconscious repressed wishes. Now it is just the repudiation of womanhood which is the cause of the disorders mentioned.

Every neurotic symptom has one or more meanings in the mind. In other words ideas may be converted into physical symptoms. The ideas which are being expressed are derived both from the unconscious wishes which have been repressed, and from the faculties (moral, etc.) which have brought about repression. Hence, the symptom represents a compromise between the rejected idea and the forces which have rejected it. They are both permitted a certain amount of expression in the symptom.

Disorders of menstruation brought about in this way are extremely common. Amenorrhea, for instance, may be a neurotic symptom due to the repudiation of womanhood. The following cases may illustrate this.

CASE 1.—A young woman who came for analysis for a neurotic condition, suffered from primary amenorrhea until her twentieth year. Examination by a gynecologist showed perfectly healthy organs. The girl was well built, strong, healthy looking, and with excellent color. The analysis proved that she began to menstruate only when the increasing claims of womanhood began to dominate the situation more and more. As a girl she had been very much of a tomboy; she preferred the society of boys to that of girls. She was very envious of a brother in whom as a child she had discovered the penis, and could not bear him to do anything which she herself could not do. She grew up very scornful of men and felt great hostility toward them. She wore coats and skirts with collars and ties, low-heeled shoes like a man, and carried a heavy stick. When, however, her feminine feelings were stimulated by the attentions of a cousin, in her twentieth year, she began to menstruate. Prior to this the analysis showed desires which were largely masculine.

CASE 2.—A married woman, aged thirty-five, suffering from insomnia came for analysis. It soon became evident that she was suffering from a severe anxiety hysteria, with symptoms connected with the sexual function. Thus at each period she suffered from severe dysmenorrhea which forced her to take to bed. In addition, she suffered from vaginal anesthesia, being quite frigid in the sexual act. In her general attitude she was strongly masculine, extremely hostile to her husband on the least occasion, and was frequently filled with remorse afterwards, as she could not understand why she was so hostile. A gynecologic examination showed no organic disease of any kind.

Among her various symptoms was an obsessional idea. When she saw a knife, she was filled with anxiety, and felt the impulse to cut her throat. The analysis

showed the impulse was based upon the unconscious desire to cut off her husband's penis. It was in fact a punishment of the talion kind which she felt she ought to suffer. An eye for an eye, a tooth for a tooth. But this wish in reference to her husband was only the repetition of a childhood wish against her brother, two years older than herself, in whom she had first discovered the penis and of whom she had felt intensely envious on this account, and had at that time impulses to injure him. This impulse became extended to all men against whom she felt strong desires of revenge.

Wherever she was she could not bear to feel she was not as strong as a man, and used to vie with them in such things as muscular feats. If she saw a man in the street coming towards her, she would pull herself up and say to herself "I am as good as you are," thereby showing her real feelings of inferiority. She felt weak in her genital organs, and thought a man was strong there. She dressed in rather masculine attire, and refused to wear feminine underwear. As a girl she insisted upon riding a boy's bicycle. The dysmenorrhea proved to symptomatize part of her repudiation of womanhood, based on the childish envy of the penis.

The pain which accompanied each period, and which was also associated with severe depression was just a repetition of the painful psychologic trauma, resulting from her childhood discovery, expressed in this physical form. The blood also repeated the idea to her, which she had formed as a child, that it must have been cut off. When she first menstruated, she was horrified, and ran to her mother saying her genitals had been cut. This phantasy, of course, arose from her childhood impression that the penis had been cut off, a memory which was now unconscious, but which was stimulated every time she menstruated by the sight of the blood. The depression which accompanied each period also proved to be a repetition of her feelings when the trauma was first felt.

The vaginal anesthesia proved also to be a repudiation of her womanhood. It was partly a desire to deny the existence of the vagina, and partly a desire to disappoint her husband. Up to the time of her marriage, she blinded herself to the existence of a vagina. She did not believe, in face of facts, that there was any opening there. After the first coition, she wept bitterly and was intensely hostile to her husband because he had forced her to accept the rôle of a woman, although she was not conscious of her motive for being hostile.

The analysis resulted in a complete change in her character. Vaginal feeling was restored, so that she enjoyed the normal orgasm, and her dysmenorrhea with its attendant depression completely disappeared.

CASE 3.—A married woman, thirty-nine years old, came for analysis for the suffering caused by obsessive thoughts that her son, aged fifteen, would die. Here again the analysis showed a strong repudiation of her womanhood based on the same idea. She also could not love her husband, though she wanted to do so. He had forced her to accept the rôle of womanhood by the sexual act, which again provoked feelings of hostility to him. She was quite frigid in coitus, and when a baby was born, she wept bitterly and refused to look at the child or to suckle it. Only after weeks would she take any notice of it. She wished it would die. Her fears later for the boy's death were really based on her original desires that he should die. Here again she suffered from dysmenorrhea and intense depression at her periods, which were proved to originate in the same way as in the previous case, and disappeared completely in the analysis.

When there is no organic disease present, vaginismus is usually recognized to be a purely hysterical manifestation. In the analysis of such cases it is always found to depend upon the repudiation of the

feminine rôle. Abraham\* mentions a case where the patient suffered from hysterical adduction of the thighs whenever her husband attempted coitus. This symptom disappeared during the analysis, to be replaced by a defence in the form of vaginismus which also finally disappeared in the analysis.

In Case 2 the patient also suffered at times from vaginismus. It was found to be due to a desire to disappoint her husband, and also represented a phantasy of pinching or crushing his penis, thus being an unconscious repetition of her feelings toward her brother as a child, and had the same significance as her impulse to cut her throat.

All cases of hysterical vaginismus which have been analyzed show the same motive at work, namely, the repudiation of the feminine rôle. Pseudocyesis is generally recognized as representing a wish for pregnancy. In other words, the wish is capable of producing a remarkable condition, outwardly resembling pregnancy. If a wish can be so potent in the one direction, may it not be in the other also? In other words, may not these cases of abortion for which no organic reason can be found also be due to the wish to repudiate the feminine rôle? I have no experience of such cases in analysis, but the vomiting accompanying pregnancy with such varying intensity can certainly be shown to depend largely on the rejection of pregnancy. The vomiting then expresses the desire to get rid of the child in the oral way. The reason for this is that the phantasy so often created by the child is that something has to be eaten to produce the child. Hence, in order to get rid of it, the woman must vomit. This may take place in women who consciously want a child, because the motivating causes are unconscious.

The importance of the repudiation of womanhood is seen to lie not only in its effects upon the woman herself, but also in the reactions it brings about in her husband, often ending in a complete failure of the marriage. Again the children of such mothers, as a result of the environment they are brought up in—the quarrels between the parents which ensue—and the lack of love which the child feels, and so much needs, are more than likely to be neurotic.

27 NOTTINGHAM PLACE.

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\*International Journal of Psychoanalysis, III, part 1, p. 16.

## GESTATION IN A MONKEY (*MACACUS RHESUS*) AND ASSOCIATED PHENOMENA

BY CARL G. HARTMAN, PH.D., BALTIMORE, MD.

*(From the Department of Embryology, Carnegie Institution)*

THE present paper places on record what is believed to be the first exact observation on the length of gestation in a monkey—in fact, in any primate other than man. The subject was, moreover, thought to be of interest to the readers of this Journal because of certain collateral observations on the normal menstrual cycle, on the fertile period within the cycle, and on some entirely new phenomena accompanying pregnancy.

### HISTORY OF THE MOTHER

Our female monkey, No. 2, the mother under consideration, arrived from India along with a thousand other macaques in March, 1925, and was acquired by us the following October. When she landed, she was in possession of a three or four weeks' old baby, which was born during the ocean voyage. The baby died during a cold snap soon after arrival at Nashua, Vermont. The following summer she was kept out of doors in company with numerous other monkeys, including our male, a monkey which we also purchased at the time and by which the fertile mating to be reported below was effected. It is significant that, despite free access to the male during the summer, she remained sterile, but this is a matter that relates to another series of observations which are in progress.

Monkey No. 2 is a vigorous, twelve and one-half pound female, of even disposition, and is at least seven years old. She has never been sick or "off feed" since joining our colony.

### THE NORMAL MENSTRUAL CYCLE

For two years the menstrual cycle of the monkey in question has been followed and found to be about a lunar month—nearly twenty-six days, to be exact, or 11 cycles from June 30, 1926, to April 8, 1927. During this time she was as "regular" as women often think they are. On the exact length of the menstrual flow observations are lacking, since examinations were not made daily, but usually only three times a week. However, no menses lasted over five days, and seemed to be usually less.

The progress of the menstrual cycle was followed by an examination of the cell content of the vagina, not usually by the well-known method of dry, stained smears which has proved fruitful of results in the study of cyclic changes in other mammals, but by a somewhat more instructive method, the "lavage" method, as we may designate it, which seems better adapted to quantitative study.

A "lavage" is made by washing out the vagina with a given quantity of physiologic salt solution (2 c.c. in the case of small, 3 c.c. of

large females). This is placed at once into a graduated tube (a graduated Wassermann centrifuge tube with long narrow stem is convenient) and allowed to settle for two hours. The amount of sediment is then read and recorded in terms of percentage of the total fluid recovered. The sediment consists chiefly of cornified cells desquamated from the vaginal wall. The periodic fluctuations in the present case are plotted in dotted lines on the accompanying chart.

After the lavage is again mixed, a sample is further diluted and methylene blue is added. Two c.c. of the sample added to 6 c.c. of salt solution with 2 drops of 1:2000 methylene blue is a convenient proportion. The methylene blue serves to differentiate the leucocytes into two classes, usually without transitions: those that remain absolutely unstained, and those whose nuclei stain an intense blue. A drop of the dilution is transferred to a blood counting chamber and the absolute number seen within the ruled area (0.1 c.c. volume) recorded. The procedure is the same each day and each animal has its own pipettes and measuring tube so as to reduce possible variables to a minimum.

It will be observed from the chart that the leucocyte count drops to nearly zero in the interval; the curve of greatest desquamation from the vaginal wall rises to a maximum in the latter part of the interval, to fall, usually very low, about the time of menstruation. By means of daily washes it is possible often to note the imminence of menses several days in advance. These observations corroborate Corner's description of cyclic changes in the monkey vagina, as published in his pioneer work of 1923. It is important for the reader to note the cyclic changes as shown in the accompanying chart in order correctly to evaluate the interpretations of results as set forth below.

#### MATINGS

The chief reasons why accurate observations on the length of the gestation period in apes and monkeys are still lacking are these: first, primates have no definite "heat" periods but copulate at any time, some species with great frequency; and second, males and females are usually caged together continuously over long periods. In the present case, matings were made only on certain dates recorded in the protocol. The first three matings were made with reference to the female's sex behavior in relation to other females or to an immature male kept in the same cage. Latterly, however, the matings were entirely with reference to the menstrual period and the vaginal examinations. The matings were as follows:

With Male A, Nov. 19, 1925, second day after cessation of menses.

With Male A, Dec. 14, 1925, twentieth day of cycle (a cycle is considered as beginning with the onset of menstruation).

With Male A, June 4, 1926, twenty-second day of cycle.



With Male D, Sept. 1, 1926, sixteenth day of cycle.

With Male D, Feb. 1, 1927, fourteenth day of cycle; leucocytes practically zero, had been decreasing for several days.

With Male D, March 1, 1927, thirteenth day of cycle; leucocytes practically zero, had been decreasing for several days.

With Male A, April 16-19, 1927, ninth to twelfth day of cycle; leucocytes on the decline, but not yet zero.

The last mating is regarded as the effective one, inasmuch as it is the only mating that was followed by any changes other than those appertaining to the normal menstrual cycle, as will appear from an inspection of the chart; indeed, two menstrual periods followed the last infertile mating.

In this connection, attention might be called to the temporary vaginal leucocytosis following the matings. Whether the introduction of foreign proteins ("spermatotoxins" or other compounds of the complex semen) into the vagina constituted the stimuli for the migration of the leucocytes remains a problem for further study.

#### THE FERTILE PERIOD OF THE CYCLE

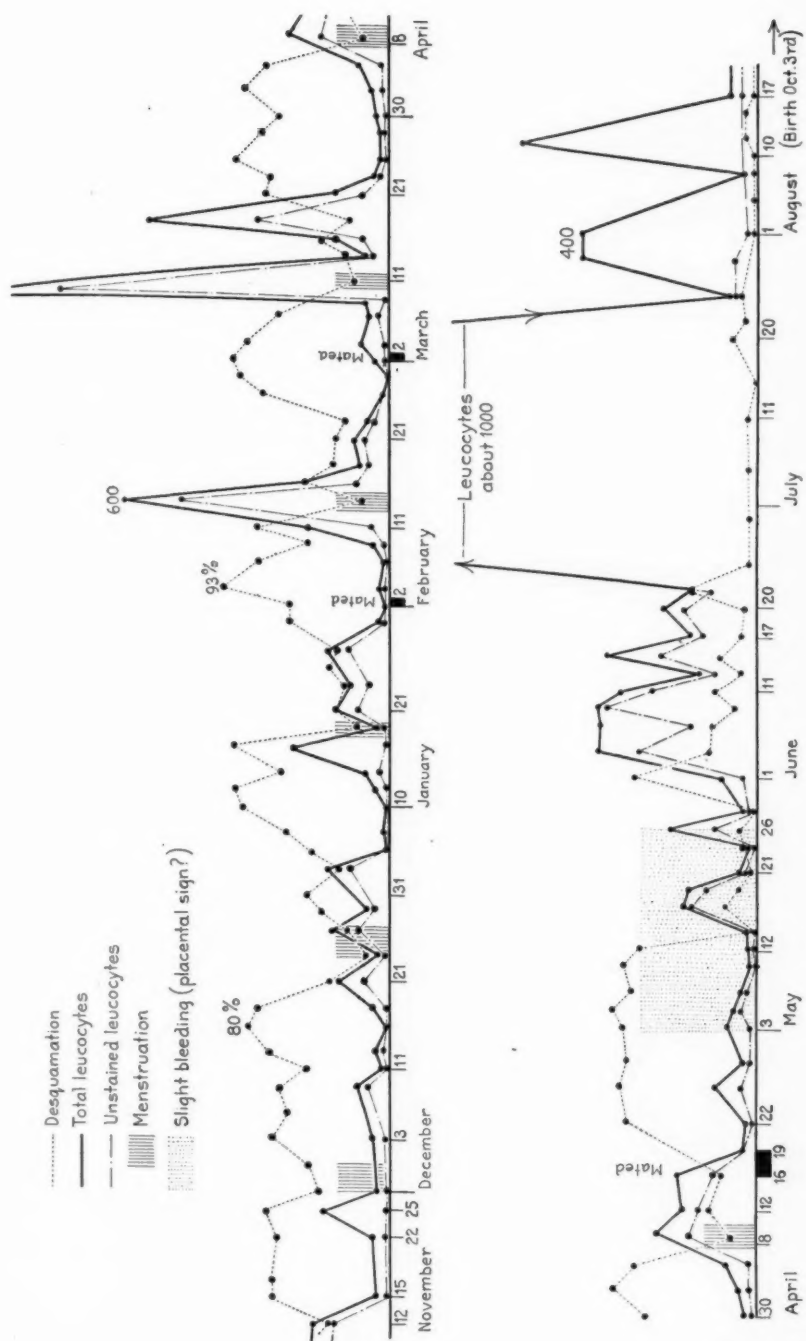
It is now generally accepted by gynecologists that in the human species the optimum period for conception is about ten to fifteen days after the beginning of the menstrual flow. In the monkey, Corner (1923) records the recovery of a tubal ovum on the fourteenth day, a uterine ovum on the seventeenth day of the cycle; Allen (1927) recovered one tubal ovum on the tenth, another on the fourteenth day of the cycle. One of my own monkeys died suddenly of pneumonia on the eleventh day of the cycle; two freshly ruptured follicles were found in the ovary.

In the present case, the last mating is the only one of the seven matings which falls within the ovulation period of *Macacus rhesus* as thus far determined. Furthermore, it took place not after, but just before the leucocyte count dropped to zero. Considering the three last matings together, one is led to infer that the ovum cannot wait long for the spermatozoa, a conclusion quite in line with the growing evidence that the mammalian ovum is extremely short lived (Hartman, 1924, Grosser, 1924, 1927). There is no doubt that the disappearance of leucocytes from the vaginal smear is due to follicular hormone (see Allen, 1927, for bibliography); hence, one would expect ovulation to occur about the time the leucocytes reach zero. An inspection of the chart, however, would seem to indicate a short lag or refractory period in this regard.

#### THE VAGINAL LAVAGE DURING PREGNANCY

The last menstruation before the fertile coitus occurred April 8; it had not begun on April 5; on April 12 there was no longer a trace of the menstrual flow. We may conservatively set the beginnings of





the flow, the onset being usually gradual, on April 7, though it may well have been April 6. On May 3, about the time of an expected new period, a few red blood cells were to be seen in the vaginal lavage, and this continued for each of the eleven examinations until May 26, a total of twenty-three days. The bleeding was always very slight and was never visible externally. On May 14 the protocol contains the entry "many reds"; on May 3, "several reds"; on May 19, when the leucocytes numbered 164 in our arbitrary unit, the erythrocytes numbered 20.

The presence of erythrocytes in small numbers early in the formation of the placenta recalls the discovery by Long and Evans (1920) of the "placental sign" or "erythrocyte sign" in the rat; that is, when implantation takes place, and only then about the fourteenth day of gestation, the vagina contains microscopically demonstrable red blood cells. Their appearance is explained by Evans and Burr (1927) as due to slight leakage from the developing placenta. If in the present case ovulation and fertilization occurred April 19, the ovum was fourteen days old when the bleeding began and entering the sixth week when it stopped. Whether the observed bleeding really constitutes a "placental sign," that is, a genuine and very early sign of pregnancy, is devoutly to be wished, though, of course, by no means proved by the single case. A number of fine old macaques are on hand to test the theory further. It is needless to suggest that the clue be followed by gynecologists in human cases.

Following the cessation of the "placental" bleeding, a long continued vaginal leucocytosis ensued, as may be seen from the chart. The meaning of this is not clear. Unfortunately, there are no observations on the vaginal content after August 17, inasmuch as it was thought best to disturb the animal as little as possible; hence it is not known whether or not the leucocyte content of the vagina returned to normal. If one were allowed an opinion, it would be in favor of a low leucocyte count in the later stages of pregnancy due to the absorption of placental hormone, evidence of the presence of which is to be seen in the exacerbation of the sex color during pregnancy, as will appear below.

After June 15, there are a number of entries in the protocol of mucous shreds appearing in the lavage. This accords with findings in human pregnancies.

The cells of Papanicolaou (1925), supposedly diagnostic of pregnancy in women, were looked for and are recorded in the protocol by a number of entries from June 1 to August 17. They are bizarre epithelial cells as described by Papanicolaou: linear, lunar, and boat-, club-, and horseshoe-shaped. I doubt, however, whether these cells are characteristic of pregnancy as such; but I suspect that they are a mark of amenorrhea whether that be due to pregnancy or to other

causes. I can make the same statement for the opossum. The matter will be studied more intensively on other occasions.

#### OTHER PHENOMENA ACCOMPANYING PREGNANCY

The first attempt to palpate the fetus was July 20. On August 5 the head seemed to be about 30 mm. in diameter. On August 19 the fetus could be felt in its entirety and was active. It had the "head presentation" position. On September 12 and again on September 19, the "bruit placentaire" could be heard with the stethoscope on the right side; on September 26, however, the audible point had shifted to the midventral line.

Observations on the sex color of the mother are of interest from an endocrine standpoint. The color change on the female's hips and buttocks (the "sex skin") during pregnancy was not so striking because she happens to be a female that always has a very livid sex skin which blanches but slightly at about the menstrual period (Collings, 1926). The red color, however, comes and goes in a striking menstrual wave at other regions which are red only in the interval, namely the face, the nipples, the thighs below the sex skin, and the calves to the heel. In this brilliant condition she remained throughout gestation, at least after July 8 when the point was first written down in the protocol. Some days after parturition the color had decidedly decreased.

This periodic reddening during the interval of the menstrual cycle is attributable to the follicular hormone, as proved experimentally (Allen, 1927); during gestation, to the placental hormone. So far as we know now these two hormones are identical. This reddening of the female monkeys to the maximum intensity I have seen in more than a dozen pregnant monkeys that have come to my notice.

#### THE PERIOD OF GESTATION

Cuvier, in the second edition (1828) of his famous book, "Le Règne Animal," states categorically (p. 116), "leur gestation dure sept mois" and in a footnote quotes one Élien who observed the parturition of a monkey in India. No details are given, but the statement is quoted by writers throughout the century. Selater (1900, p. 9), speaking of *Cercopithecus lalandii* (vervet monkey) says: "The period of gestation does not seem to have been recorded, but that of an allied form, the malbrouch (*C. cynosurus*) is stated by Babu R. B. Sanyal, of the Calcutta Zoological Gardens, to be seven months." Bluntsehli (1913) estimates the duration of pregnancy for *Cebus* and *Chrysotrrix*, New World monkeys, as four and a half to five months. None of these statements is supported by satisfactory evidence.

In our own case the baby was born during the night of October 2-3. The period of gestation is therefore almost exactly six lunar months.

No afterbirth was found in the cage; hence the assumption is that this was eaten by the mother. There were numerous small blood stains on the floor of the paddock.

## SUMMARY

1. The length of gestation in the case of *Macacus rhesus* described in this paper was almost exactly six lunar months. This is the first authentic record of gestation in any primate except the human being, so far as we know.

2. The fertile mating took place between the ninth and the twelfth day after the beginning of the last preceding menstruation, whereas six other previous matings outside this period had been ineffective.

3. A slight bleeding, presumably from the immature placenta (the "placental sign" of Long and Evans), microscopically demonstrable, occurred from about the fourteenth to the thirty-seventh day of gestation. This phenomenon may furnish a clew to the very early diagnosis of pregnancy in human beings.

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### AN ANALYSIS OF THIRTY-TWO CASES OF ECTOPIC PREGNANCY AND THREE SUSPECTED ECTOPIC PREGNANCIES\*

BY EDWARD ALLEN, M.D., CHICAGO, ILL.

THE recognition of ectopic pregnancy is probably the most urgent factor in differential diagnosis which confronts the gynecologist in his daily practice.

We have attempted in this small series of cases to analyze critically the important details of history and treatment in order to ascertain if a correct diagnosis is possible, short of laparotomy, in those patients presenting typical ectopic histories and palpatory findings but having some other condition to account for their clinical picture.

It is usually not difficult to diagnose extrauterine pregnancy after rupture has occurred and the patient presents the definite symptoms

\*Read at a meeting of the Chicago Gynecological Society, May 20, 1927.

of marked intraperitoneal hemorrhage. However, if we are to save the patient this dangerous loss of blood and operate while easy conservative surgery can still be done, it requires a more refined method of diagnosis and technic.

Fortunately, few if any ectopic pregnancies rupture without previous symptoms, which are usually of sufficient severity and duration to cause the patient to seek medical advice before rupture occurs. Many of these patients are sent home or to a hospital for observation until an acute rupture makes prompt attention imperative. Yet, if all cases of suspected ectopic pregnancy are operated upon early by laparotomy, many will prove to be complicated early uterine pregnancies, corpus luteum cysts or simple cystic ovaries.

The cases reported here have been operated upon in the Presbyterian Hospital, Chicago, on the service of Dr. N. Sproat Heaney. We have included for comparison in detail of history and treatment five rather advanced cases with marked intraperitoneal hemorrhage. These patients either sought treatment late or were referred by other doctors and were operated upon as soon as admitted.

*Age and Previous Pregnancies.*—In the cases of ectopic pregnancy the average age was 30.8 years; the youngest 18 and the oldest 41 years. More than one-half were 30 years or over. Sixteen had not been previously pregnant. Nine patients had given birth to one or more full-term children. Four patients had been pregnant but had aborted during the early months of pregnancy. If we include these four cases of abortion and the three who had a previous ectopic pregnancy, it raises the percentage of relatively sterile cases to 71.7 per cent. Twenty-two of these patients had been married three years or longer. Two were unmarried.

We feel that relative sterility is an important equation in the cause, diagnosis, and treatment of ectopic pregnancy. The same factors whether they be infection, infantilism or some interference with the descent of the ovum, undoubtedly predispose to ectopic implantation as well as to relative sterility.

The diagnosis of extrauterine pregnancy becomes more probable in a patient complaining of irregular vaginal bleeding and cramp-like pains in the lower abdomen if they are associated with a history of relative sterility. Since so many of the patients have not borne children, we must diagnose and treat them early before tubal and ovarian damage has become too marked.

*Menstrual Data.*—Where the complete menstrual history was available most cases were normal according to onset, type, duration and pain; 89.9 per cent began to menstruate between the ages of eleven and fourteen years. Only two began late, one at eighteen years and the other at nineteen years; 80.0 per cent were regular, 19.2 per cent irregular in their menstrual habits. Only one of the patients com-



plained of severe dysmenorrhea and that was the patient who began to menstruate late, when she was eighteen years old. The rest described the pain as slight or none at all. A little more than half gave no history of dysmenorrhea. If infantilism is associated with late onset, irregular habit and dysmenorrhea it does not seem to be an important causative factor in this group of extrauterine pregnancies. In only two cases was definite record made at the time of operation that the uterus was smaller than normal.

One-third of the cases with exact last menstrual period dates had not missed a menstrual period but began to spot on or before the expected time. One patient began to spot seven days before her expected date, another two days before. Two additional cases had two days, one, three days, and two others five days of amenorrhea. These last discrepancies are within the variation limit of any normal menstrual cycle. Irregular bleeding or spotting was the most constant symptom present, more so than pain.

Thirty out of thirty-one of these patients had irregular vaginal bleeding for a period of from five to sixty-seven days. The average was 30.4 days. Only one case had a complete amenorrhea which lasted sixty-two days, until she was operated upon. Two of these cases of bleeding bled as much as a regular menstrual period at any time during their relative amenorrhea. This bears out the usual teaching—the more profuse the bleeding the less probable it is we are dealing with an extrauterine gestation. All the patients were questioned very closely about the onset of this bleeding, as we feel it is one of the most important elements in a correct diagnosis. *Practically all* these patients in whom bleeding occurred at or about the menstrual time spoke of it at first as their last regular period. They did not realize that the amount and duration was different from that of their usual flow until asked specific questions.

*Pain.*—The usual lancinating textbook pain was conspicuous by its absence in all but two cases. One of these patients described it as a knife-like stab in the side associated with fainting, which occurred four days before operation. She had a fetus of three and one-half months' size extruded into a large walled-in blood clot in the region of the left tube. The other had an ectopic pregnancy in the right tube 8 cm. in diameter which had eroded one of the larger vessels and the abdomen was filled with old blood.

Severe cramps in the lower abdomen occurred in 31.2 per cent, two with associated pain in the thigh and leg. All these patients had free blood in the peritoneal cavity. Two cases, however, did not give a history of any discomfort, but came in for irregular vaginal bleeding and both were found to have free blood in the abdomen. Three patients had typical phrenic irritation pain radiating to the shoulder and neck.



Two patients gave a history of passing what may have been a decidual cast. In both instances this was the probable cause in the mistaken diagnosis of uterine abortion. The first patient had been examined by her physician at home. He told her that the tissue passed was a miscarriage, but as she continued to spot she sought further advice. The other patient was a graduate nurse and the wife of a doctor. She stated she had been curetted for an incomplete abortion. She had continued to bleed, however, and felt that the curettage was also incomplete. When the possibility of ectopic pregnancy was suggested to her, she replied that her husband had seen the placenta. In both cases curettage did not reveal sufficient cause for the bleeding but free blood was demonstrated in the pouch of Douglas by colpotomy.

*Blood Changes and Temperature.*—Sixty-nine and nine-tenths per cent of all cases had a leucocytosis of from 10,000 to 20,000. The temperature range in these patients was from 98° to 100° F. The highest admission temperature was 100° and this patient had 7750 white blood cells. The patient with 20,000 leucocytes had a temperature of 98.6° F. and the abdomen was filled with free blood. A definite leucocytosis associated with a temperature of 99.2° or less indicated bleeding into the peritoneum. Twice as many definitely increased leucocyte counts as normal counts were recorded in the patients with intraabdominal bleeding. The lowest hemoglobin recorded was 34 per cent (Dare); average 73 per cent. Only five patients showed definite evidence of loss of blood with readings of less than 70 per cent.

*Operative Procedure.*—Every year we are increasing the number of gynecologic cases operated upon vaginally; this is especially true of ectopic pregnancy. Only four of these thirty-two patients were operated upon by straight laparotomy. A résumé of these four case histories will be given later.

In all the other twenty-eight cases whether straight vaginal or vaginal combined with abdominal incision, the diagnosis was confirmed by the following procedure: The uterus was always first curetted to rule out early uterine abortion or other causes of uterine bleeding. An incision was made in the posterior fornix through the vaginal mucosa and after all bleeding points had been secured the peritoneum was opened. In all but two instances old blood could be definitely demonstrated although frequently only a few drams. In one of these patients the pregnant tube could be palpated through the colpotomy opening and brought into view by tipping the uterus backward into the incision. In the other, adhesions from a previous operation did not permit palpation or allow the small amount of blood found on abdominal exploration to reach the culdesac.

If there seemed to be too much blood in the peritoneal cavity or exposure of the affected side was too difficult, the colpotomy was closed and the abdomen opened; if not, the ectopic sac was removed

through the vagina. We were able to remove nine or 28.7 per cent vaginally. In nineteen patients the diagnosis was confirmed vaginally by exploratory curettage and colpotomy, after which laparotomy was performed.

The earlier the diagnosis is made the higher will be the percentage of cases capable of being treated by vaginal removal. Blood was found in the culdesac in patients where the tubal swelling was no larger than 2 or 3 cm. in diameter.

To many it would seem inadvisable to open an abdominal cavity containing free blood, as a culture media through the vagina. However, our results compare favorably with the patients operated upon by straight laparotomy in this series and in previous years.

The prolonged stay in the hospital of some of the patients was due to other factors than their operative recovery. Many were out-of-town patients and others could not have adequate convalescent care at home.

The highest postoperative temperature was 103.6° F. in a patient operated upon vaginally. This patient has since had a normal full-term pregnancy. The average temperature for the four straight abdominal cases was 101° F.; nine straight vaginal, 100.9° F.; nineteen abdominovaginal, 100.8° F.

The average stay in the hospital of all cases was 17.5 days; of those done vaginally 15 days, and abdominal and vaginal combined 17.9 days.

We have attempted in all these cases to do the most conservative surgery compatible with safety and still leave the patient the greatest possibility for a future pregnancy. In 37.5 per cent only the pregnant portion of the tube was removed and the stump left open. Of these six or 34.6 per cent have subsequently become pregnant. Three of these six went to term and three had a second ectopic pregnancy. These three recurrences were all tubal and of the opposite side. Three of these patients had previously had the tube on the other side removed and have not been able to conceive with the small portion of tube we were able to leave for them. In ten patients there was such destruction of tissue that the whole tube was removed including its interstitial portion.

A bilateral salpingectomy alone or combined with hysterectomy was done in the following five cases:

CASE 1.—Patient was thirty-eight years old and had had one full-term pregnancy. The uterus contained several small fibroids. The uterus and both tubes were removed vaginally.

CASE 2.—Age thirty years. We had previously removed a portion of the opposite tube for ectopic pregnancy. The stump was atrophic and closed. The remaining pregnant tube and fundus of the uterus which contained a fibroid was removed.

CASE 3.—Age thirty-eight years. Patient had had eight full-term pregnancies. The opposite tube was closed and adherent with the corresponding ovary in the culdesac. The uterus and both tubes were removed through the abdomen.

CASE 4.—Age thirty-five years. The opposite tube was closed and adherent. Bilateral salpingectomy was done.

CASE 5.—Age thirty-five years. Patient had one full-term child. The opposite tube was closed and adherent. Bilateral salpingectomy was done.

There was definite evidence of previous pelvic inflammation in 50 per cent of these patients. Notation was made of a recent corpus luteum cyst on the opposite side in four cases and on the same side as the pregnancy in one case.

We wish to include in detail the important facts in the histories, vaginal findings and treatment of the three suspected ectopic pregnancies.

CASE 1.—Age thirty-six. Patient had been married eighteen years and had had two full-term pregnancies and one miscarriage. Her menstrual history was normal. The last regular period was July 8, 1921. She began to have irregular vaginal bleeding on August 16, 1921, which continued for twenty-one days and had been accompanied by cramp-like pain in the lower abdomen for the last week.

The blood count showed a leucocytosis of 12,800, erythrocytes 4,170,000, hemoglobin 78 per cent.

In the region of the left ovary was a lemon-sized swelling which was tender on palpation.

Curettage revealed a normal amount of scrapings. Posterior colpotomy was done and several drams of straw-colored fluid escaped, which had come from a corpus luteum cyst of the left ovary.

CASE 2.—Age thirty-two years. Patient was an unmarried woman. Her previous menstrual history was normal. The last regular period occurred March 10, 1926. Amenorrhea had continued for eighty-nine days when she began to spot and have cramps in the lower abdomen. Eight days later we examined her under gas anesthesia but due to very thick abdominal walls and small vagina the examination was unsatisfactory.

The blood count was normal.

On curettage there seemed to be a little more tissue obtained than usual but no evidence of pregnancy. Tubes and ovaries were normal on inspection through a posterior colpotomy incision.

CASE 3.—Age twenty-two years. Patient had been married four months. Menstrual history was normal. Three days after her expected menstrual date she began to spot and have cramps in the right lower abdomen. This continued for two days until she was operated upon.

This patient also had a leucocytosis of 12,900.

Vaginal examination revealed a tender swelling in the region of the right adnexa about two inches in diameter. She was operated upon forty-four days after her last regular menstrual period. We obtained about the usual amount of uterine scrapings on curettage and about two ounces of turbid fluid escaped into the vagina when the culdesac was opened. There was a ruptured corpus luteum cyst of the right ovary.

The histories and vaginal findings of these three patients are typical for extrauterine pregnancy. The correct diagnosis could not have been made except by laparotomy or posterior colpotomy if we are to operate suspected ectopic pregnancies early before rupture has occurred. The treatment and diagnosis were carried out with the minimum of

discomfort and danger to the patient. The results were as accurate as by laparotomy.

Even with this small series of cases we feel we can draw the following conclusions:

1. It is often impossible to differentiate ectopic pregnancy from other pelvic lesions by history and palpatory findings alone.
2. This can be done accurately and with a minimum of risk and discomfort to the patient by diagnostic curettage and posterior colpotomy.
3. Even in cases of little doubt the diagnosis should be confirmed by the above procedure before the abdomen is opened. This procedure does not increase the operative risk to the patient.
4. Diagnosis should be made as early as possible and if findings permit, treatment should be carried out through the vagina.
5. Relative sterility has a definite relation to ectopic implantation.
6. Irregular spotting is the most constant symptom of ectopic pregnancy and pain is the second.

(For discussion, see page 566.)

### THE COMBINATION OF A SHORT MENSTRUAL CYCLE AND DELAYED COITUS AS A FACTOR IN STERILITY

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(From the Department of Obstetrics and Gynecology, College of Physicians and Surgeons, Columbia University)

THE following two cases demonstrate that a short menstrual cycle, combined with delayed coitus, the latter often due to religious beliefs, are factors in the etiology of sterility.

CASE 1.—Mrs. H. R., Jewish, came to my office on December 6, 1922, with a complaint of sterility of two and one-half years duration. She had had no previous illness, no operations, no miscarriage. She had been married two and one-half years. Menses began at fourteen years, every twenty-four days, three days in duration, moderate in amount. She had no pain during periods. Since marriage the periods have been the same. Last period November 19, 1922. During the period, between the tenth and fourteenth days from the onset of the menstrual flow, at each menstrual cycle, the patient experienced a pain low in the pelvis which lasted about twelve hours. The pain was either on one side of the pelvis or the other and frequently alternated with each cycle. Occasionally she was overdue a day or two, and when that occurred, she passed clots and had moderate cramps. This occurred five or six times during the last two and one-half years. The patient never used contraceptives. Venereal disease was denied. No leucorrhea.

The patient was a wiry young woman in good health. A general examination was entirely negative.

*Pelvic examination* showed the internal genitals negative, the parametria negative, and the tubes patent by the Rubin test. A condom specimen showed a normal number of sperm. No abnormal forms. The blood serum test did not agglutinate spermatozoa.

The treatment included placental extract, gr. 5, t.i.d., mammary extract, gr. 5, t.i.d., the purpose of which was to attempt to change the twenty-four day menstrual cycle to a twenty-eight day type. It subsequently proved unsuccessful and was discontinued because of palpitation of the heart.

Last period occurred December 15, 1922, one day overdue, clots, and pelvic pain upon passing clots. Physical findings the same.

A chance remark on the part of the patient disclosed the fact that she was deeply religious. Further questioning brought out the admission that she followed an old orthodox Jewish custom of waiting two weeks after the menstrual flow was over before coitus was attempted, so that the first intercourse in each menstrual cycle occurred about eighteen days after menstruation or about six days before the onset of the next period. In view of the possible bearing of this abstinence on her sterility, I advised her to begin intercourse one week after the onset of her flow. This she refused because of religious scruples. This advice was given on March 6, 1923. All medication was then discontinued. Immediately following her menstrual period of May 9, 1923, she decided to accept my advice, and began intercourse several days after the flow stopped. (This for the first time since her marriage.) She had no further periods following the above and when seen on July 25, 1923, she was two months pregnant.

CASE 2.—Mrs. F. M., Jewish, married two years, sterile. Menses every twenty-six days, three to five days in duration, moderate in amount. Dysmenorrhea before marriage and slight discomfort since.

A general physical examination revealed no abnormality of either the system or the pelvic organs. The tubes were patent. Spermatozoa were numerous, and there were no abnormal forms. The husband's semen digested the patient's cervical mucus completely within twelve hours.

A further inquiry into the patient's history disclosed that she also observed the custom\* of waiting two weeks after the menstrual flow was over before intercourse was attempted, so that the first coitus of each month occurred about eighteen days after the onset of the flow or about eight days before the beginning of the next period. She was advised to begin intercourse one week after the onset of the flow. The patient readily consented. She carried out my advice during August, 1926 and again during September, 1926. There was no medication. Her last period was September 15, 1926, and she is now in her ninth month of pregnancy.

The first case can be considered best in the light of recent studies as to the relationship between menstruation and ovulation. R. Schroeder<sup>5</sup> believes that for the twenty-eight-day menstrual cycle, ovulation occurs between the fourteenth and the sixteenth day, counting from the first day of the last menstrual period. Small variations occasionally occur. According to the researches of L. Fraenkel<sup>1</sup> ovulation in the twenty-eight-day menstrual cycle occurs between the eighteenth and nineteenth day, counting from the first day of the last menstrual period. According to Fraenkel when the menstrual cycle is shorter, i.e., every twenty-four days, ovulation occurs earlier, about the eleventh day following the onset of the last period.

The recurrent intermenstrual pain which the first patient complained of was most likely due to ovulation (E. Novak<sup>4</sup>). Schroeder

\*Note: It is interesting to note that both patients misinterpreted the old Talmudic Law on this matter. The law states that after all signs of menstruation have disappeared, the patient must wait full seven days before coitus can be attempted. Should the patient spot at any time during the month, she must again wait seven days before attempting coitus.



also believes that this "Mittelschmerz" is due to ovulation. This, then, would fix ovulation in the first case to the period between the tenth and fourteenth day following the onset of the last flow. This agrees very well with the findings of Fraenkel. Supposing this patient ovulated on the eleventh day of her twenty-four-day menstrual cycle, and coitus first took place on the eighteenth or nineteenth day; then allowing twenty-four hours for the sperm to reach the ovum, the nineteenth or twentieth day has been reached. The question then is whether the ovum can be fertilized at this time.

This brings up the problem as to the duration of life of the human ovum. Schroeder believes it is from twelve to fourteen days, that is, the ovum dies just before the onset of the next period. Graf Spee<sup>6</sup> states that the duration of life of the human ovum is unknown. In lower forms, such as the rat and mouse, the ovum dies after twelve hours, according to Long.<sup>2</sup> Graf Spee is therefore inclined to believe that the life of the human ovum is very short. Neither Schroeder nor R. Meyer<sup>3</sup> bring up any proof to demonstrate the long life of the human ovum. It is more than likely that in Case 1 when the sperm reached the ovum, the latter was no longer fertilizable. The fact that the patient occasionally went over a day or two and passed clots could be explained by assuming that fertilization did occur, but as the viability of the ovum at this late date was diminished, the fertilized egg degenerated and menstruation came on again.

Case 2 presents a somewhat similar picture. Assuming that with her twenty-six-day cycle, ovulation occurred on the twelfth day, coitus on the eighteenth or nineteenth day, the sperm first came in contact with the ovum on the twentieth day. It seems quite reasonable to suppose that by this time the ovum was no longer viable and fertilization did not occur.

The advice to begin coitus on the seventh day of each cycle in both cases led to immediate conception in Case 1 and to almost immediate conception in Case 2. It would appear from this that the duration of life of the ovum is short, that its viability is greatest just after ovulation, and that viability diminishes as we proceed further away from the date of ovulation.

How frequently the combination of a shorter menstrual cycle and delayed coitus occurs, I am unable to state. In my limited experience I have observed only these two cases.

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## REPORT OF A CASE OF ERGOT POISONING POSTPARTUM\*

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**A** SURVEY of the literature as far back as 1900 shows the paucity of cases of ergot poisoning.

The toxicology of the drug as described by Sollman, Cushny, Wilcox, Underhill, Peterson, and others is familiar. O'Gorman's patient had been taking drachm doses of ergot every four hours in order to induce menstruation. After some time she became giddy, fainted, had a convulsion, and lapsed into coma. Pulse 58, weak and small. There developed severe tonic contraction of the flexor muscles of the forearm, thighs, and leg. She was unconscious for three days. Contractions kept up at indefinite intervals. Patient recovered.

H. W. Emsheimer described a case of tetany in a female adult. The patient, single, having passed her period three days, took a large dose of ergot and continued its use in drachm doses every two hours for five days. She did not abort. Two days from date at which the ergot was discontinued, she was suddenly seized with severe epigastric cramps, with nausea and vomiting, and passed into a semi-delirious and restless state. This was followed by rigidity of all extremities and a typical bilateral carpopedal spasm. Patient recovered.

W. J. Stewart McKay reported a case of gangrene of the fingers, following the administration of ergot. The patient, a para v, aged thirty, had missed a period and obtained a twelve-ounce bottle of ergot with the idea of inducing abortion. She took one tablespoonful three times daily for one week, and as there was no result, she waited three days and obtained a second bottle which she finished in a week. She had not aborted. Before she had entirely finished the second bottle, her arms began to ache, the fingers became swollen, and by and by several of them became gangrenous at the extremities as far as the distal joint. The patient was operated upon one year later.

In the case of Rosenbloom and Schildecker the patient was a young girl who suddenly had been taken ill about an hour after her supper. She was cyanotic, had vomited considerably, and had a rapid pulse. Stimulation brought about recovery. Eleven days afterward, she was found in a serious condition. She was unconscious, and there was suppression of urine. Clonic convulsions occurred, and contraction of the uterus could be noted visually as well as by palpation. Bloody stools, containing pieces of intestinal mucosa, were passed. Death occurred nineteen hours later. Necropsy disclosed a pregnancy and a severe inflammation of the entire gastroenteric tract. Portions of the liver, kidneys, stomach, and intestines were removed for toxicologic examination. Dragendorff's process as described by Witthaus was the method employed. The crystals obtained were compared with some preparations of ergotin and were found to agree in every particular.

It is impossible to estimate definitely the fatal dose of ergot and its preparations, because the preparations vary so widely in their content of the active principles. There is evidence that some patients may even have a certain degree of idiosyncrasy for the drug, as shown by the fact that one fluid drachm of the fluid extract has caused symp-

\*Presented at a meeting of the Section on Obstetrics and Gynecology of the New York Academy of Medicine, April 26, 1927.

toms to appear, while ounce doses have caused no untoward poisonous effects. Gangrene and death have occurred after twelve grains of the extract.

#### REPORT OF CASE

Mrs. B. L., aged thirty-five, para ii, delivered a full-term baby spontaneously four years ago. A laparotomy was done three years ago for retroversion of the uterus. She last menstruated September, 1925. The expected date of confinement was June, 1926. She was highly neurotic. The vertex presented. Fetal heart was heard in the left flank. Blood pressure 120/70. Urine showed a faint trace of albumin. Subsequent antepartum examinations revealed the same findings.

Onset of labor occurred June 11, 1926, at 8 P.M. The patient was admitted to the Jewish Maternity Hospital June 12, 1926 at 2 A.M. The external and internal os admitted one finger, the cervical canal was 1 cm. long, the membranes were ruptured, the vertex presented with a small segment through the inlet, and the fetal heart was heard in the left flank.

Examination six hours later disclosed the cervix to be four fingers' dilated; an L. O. P. position, and the fetal heart in good condition. At 3 P.M. the same day, thirteen hours following admission, the cervix was fully dilated, and the vertex unengaged in the L. O. P. position. The fetal heart was not heard. Pains occurred every three minutes, strong and regular.

Morphine sulphate, gr.  $\frac{1}{4}$ , was given. She delivered a stillborn baby spontaneously on June 13, at 8 A.M. (eighteen hours later). The total duration of labor was thirty-six hours. Weight of baby eight pounds, three ounces. The placenta appeared normal.

On the first day postpartum the rectal temperature was 102.4° F.; pulse 120. She was placed in Fowler's position, an ice bag was applied to the fundus, and one drachm of the fluid extract of ergot given three times daily.

On the fourth day postpartum the uterus was enlarged, soft and boggy. The lochia was foul and scanty. Ergot was continued in order to favor contraction and retraction of the uterus. The temperature ranged from 100° to 101° until the ninth day.

On June 20, the evening of the sixth day postpartum, the patient had a fainting spell of short duration. When I saw her one-half hour later, she complained of coldness, numbness, tingling, and weakness in both the upper and lower extremities. The face appeared cyanotic, and she was slightly dyspneic. The heart was normal. The blood pressure taken on either arm did not register. The picture was one of collapse. The physical examination revealed evidences of a complete disappearance of pulses simultaneously in both radials, popliteals, and dorsalis pedis arteries. The brachial and femoral arteries, however, were not involved. Both hands and feet were cyanotic and cold to touch. Adrenalin and caffeine sodium benzoate were given by hypodermic.

The following day the patient complained of headache, appeared very restless, irritable, and showed symptoms of disturbed mentality. Luminal and morphine were given. She frequently refused nourishment, was nauseated and vomited on one or two occasions. She complained of slight pain in both feet, and there was a bilateral mottled appearance of the skin on the plantar and dorsal areas extending up to the ankle. Ergot had been discontinued. The total amount taken during this time was two and a half ounces.

On June 22, the eighth day postpartum, pulsation in the radials, popliteals, and dorsalis pedis arteries was still absent. The right foot gave the impression of early gangrene.

A neurologic examination disclosed the following: cranial nerves normal. Upper deep reflexes lively and equal. Right knee jerk greater than left. Sensation normal

in upper extremities, body, and thighs. Areas of hyperalgesia beginning at about middle of each leg descending in stocking fashion to the ankles, with gradually diminishing perception of pin prick and ending in complete analgesia in both feet. Touch was similarly but less markedly affected. The pupils reacted to light and accommodation. Eyegrounds were normal.

On the morning of June 23, the ninth day postpartum, about forty hours from date at which the drug was discontinued and approximately sixty hours following the loss of pulsation in the radials, the hands felt warmer, and there was a return of pulsation in these vessels. The left foot was cyanotic and was suggestive of impending gangrene.

The urine showed a faint trace of albumin. A blood count taken on June 21, showed R.B.C. 3,000,000, W.B.C. 23,000, polynuclears 82 per cent, small lymphocytes 15 per cent, large lymphocytes 3 per cent, and hemoglobin 64 per cent. Another count taken three days later showed R.B.C. 3,700,000, W.B.C. 20,000, polynuclears 88 per cent, small lymphocytes 10 per cent, large lymphocytes 2 per cent, and hemoglobin 70 per cent. Wassermann test negative.

On June 24, the tenth day postpartum, popliteal pulsation returned. On the next day the right foot appeared entirely normal, and pulsation was felt in the right dorsalis pedis artery. In the middle aspect of the left foot, however, a patch of gangrene the size of a quarter was observed; and on the twelfth to thirteenth days postpartum there was evidence of superficial necrosis on the dorsal area of the great toe and small patches on the other toes.

On June 28, the fourteenth day postpartum, there was quite marked edema of the dorsal aspect, with mottling half-way up the foot. The entire plantar surface including the toes showed a healthy color to the skin, with the exception of an area the size of a silver dollar on the middle portion which appeared gangrenous. The foot appeared warm.

On the sixteenth day postpartum sensation returned in both the plantar and dorsal region of all the toes. One week later there was considerable sloughing of the skin on the middle portion of the dorsal aspect. Thereafter the edema on the dorsal area became considerably less, and on July 11, the twenty-seventh day postpartum, pulsation of the left dorsalis pedis finally returned. The slough from the dorsum and plantar surfaces was removed, and the nail of the big toe came away. The wound was treated accordingly, and the patient was discharged from the hospital on August 27, seventy-five days postpartum, with the entire wound practically healed and with ability to flex and extend the toes slightly.

She was requested to report for further observation, and when last seen in June, 1927, she presented the following: Slight atrophy of the foot, cold to touch. There was loss of the nail of the big toe and trophic disturbance of other nails which were rigid, white, and chalky. The pulses were good. There was no evidence of serious involvement of the circulation. The reflexes were normal. There was contraction of the interossei muscles, and flexion contraction of all the toes produced metatarsalgia, giving her slight pain in walking.

#### COMMENT

That the above case appears to be one of ergot poisoning seems beyond question. A careful study of the history and clinical course of the disease will dissipate all doubt that this patient presented uncommon features of ergot poisoning. Many patients may produce symptoms of intoxication, manifested by nausea and vomiting, particularly when the drug is employed by women in attempts at abortion, but, of the cases described, none showed the severe type embracing both the spasmodic and gangrenous forms herewith reported.

I believe that she evidently had an idiosyncrasy for the drug, because the amount consumed was not large. Even without the aid of any therapeutic agent used, it is interesting to note, that after the condition was suspected and the drug discontinued, relief of symptoms was obtained and the return of pulsation in many vessels occurred.

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ONE WEST ONE HUNDRED AND TWENTY-THIRD STREET.

## A NEW APPARATUS FOR RESUSCITATION OF ASPHYXIATED NEWBORN BABIES

BY JOSEPH KREISELMAN, M.D., HOWARD F. KANE, M.D., F.A.C.S., AND  
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THE object of this apparatus is to fulfill one of the essential requisites in the treatment of asphyxia neonatorum, namely, to supply oxygen to the blood in an effective manner with the utmost assurance that even though the operator be inexperienced, there will be no danger to the patient. This is accomplished by delivering the oxygen in controlled amounts and at controlled pressures to the lungs without obstruction to the airway.

The apparatus herewith presented is simple, easy to operate, and has safety devices which make it impossible to deliver oxygen to the lungs at excessive pressures. It consists of a high pressure regulator, a low pressure regulator, a control valve, a pressure relieving and indicating device, and a one unit face-piece with breathing tube.

The high pressure regulator (*B*) has one gauge (*D*) to indicate the pressure of the cylinder contents, and another (*E*) to indicate the pressure against the second regulator (*F*). The low pressure regulator (*F*) is a large diaphragm unit giving the necessary low pressure. Although two pressure reducing devices are employed in order to safeguard the patient, it is desirable to have further assurance that the patient will not be injured by excessive pressure under any conditions. To this end a pressure relieving device (*Q*) is employed. This device not only relieves excessive pressure, but also gives constant indication of the pressure of the gas by means of a water column in a graduated glass tube (*S*).

A new type face-piece (*N*) is used. This is a bakelite shield adapted to fit over the mouth and nose. This face-piece is funnel-shaped and its smaller end is provided with an aperture for admitting the gas. The larger end of the shield is

covered on its edge by a soft rubber pad (O) for sealing the space between the face of the patient and the shield. A stiffly flexible rubber breathing tube (K) is attached to the shield at the point through which the gas enters, and extends over the tongue into the pharynx. This unit (face-piece and breathing tube) provides a clear, unobstructed passage for the gas from the machine to the lungs of the patient without change in the pressure of the gas. Simply placing the face-piece over the face with the breathing tube over the tongue provides this free passage. This is absolutely essential in the resuscitation of asphyxiated newborn babies. If this breathing tube were not used, the result sought would be largely defeated because the relaxed tongue would be pushed backwards, obstructing the air passage. In this event, if sufficient pressure were employed to force oxygen past this obstruction at all times, there would be danger of suddenly filling the lungs with gas under such pressure that they would be ruptured. With the improved face-piece, however, it is possible to use an entirely safe and nonfluctuating pressure.

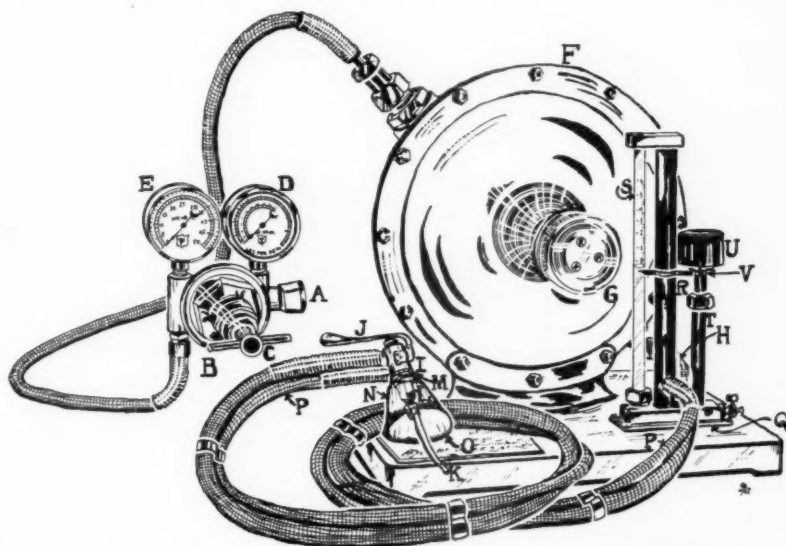


Fig. 1.—Resuscitation Apparatus. A, oxygen or carbon dioxide cylinder; B, high pressure regulator; C, high pressure regulator handle; D, high reading gauge; E, low reading gauge; F, low pressure regulator; G, low pressure regulator adjusting knob; H, oxygen tube from low pressure regulator to valve on face-piece; I, face-piece valve; J, valve handle; K, breathing tube; L, auxiliary oxygen inlet and expiratory outlet; M, expiratory outlets to atmosphere and atmosphere inlets; N, Bakelite face-piece; O, rubber piece; P, connection from face-piece valve to manometer; Q, combined safety valve and manometer; R, stand-pipe; S, graduated glass tube; T, adjustable overflow tube; U, overflow cup; V, pressure indicator.

By means of a slip-joint the face-piece with breathing tube attached is easily removable for sterilization by boiling.

The valve is so designed as to serve a double purpose. When the handle is depressed, oxygen is admitted to the mask, and when it is released the expired gas escapes into the atmosphere through openings which are provided. The valve (I), when operated, provides a passage for the flow of gas from the low pressure regulator through the breathing tube to the lungs, and, at the same time closes the expiratory outlet (M) and connects with the pressure relieving and indicating device (Q). When the valve handle is released, the gas inlet is closed and the expiratory outlet is opened, permitting the escape of gas from the deflated lung through L and M. Expiratory outlets L and M also provide for the entrance of air, should respiration occur while the valve is closed.



The pressure at which the gas is delivered is controlled by adjusting the knob (*G*) on the low pressure regulator (*F*). Opening the valve (*I*) allows the gas at this determined pressure to pass through tube *H* to the face-piece and thence to the lungs. This pressure is transmitted through tube *P* to manometer *Q* and is indicated by the rise of a column of water in glass tube *S*. This manometer, *S*, combined with stand-pipe, *R*, and adjustable overflow tube, *T*, comprises a safety device. These three tubes intercommunicate and are filled with water to the level of the zero mark on the manometer. Gas under pressure being conveyed to the top of stand-pipe, *R*, forces the fluid to rise equally in manometer and adjustable overflow tube. The indicator (*V*) attached to the base of the overflow cup (*U*) is adjusted to the upper point of the desired excursion of the water column. Should the required pressure be exceeded, the column of water in the adjustable overflow tube would be forced into the cup, allowing the relief of excess pressure.

Pressure of approximately six inches of water has been found by experiments to inflate the average lung satisfactorily. Should the pressure, however, be so great as to cause the manometer tube to overflow, the lungs would not be damaged.

#### OPERATION OF APPARATUS

1. Raise or lower the overflow cup of the manometer until the indicator points to the "6" mark on the manometer scale. Pour water into the cup until the level rises to the zero mark.
2. Open the cylinder valve.
3. Adjust the high-pressure regulator so that the low-reading gauge indicates 5 pounds pressure.
4. Close the face-piece and tube with the palm of the hand, press the valve-handle, and adjust the low-pressure regulator by turning the knob until the water rises to the desired level in the water column.
5. Raise or lower the overflow cup until the indicator points to the desired level mark on the manometer scale.
6. Place the face-piece in position over the mouth and nose with the breathing tube over the tongue into the pharynx.
7. Press the valve handle to inflate the lungs, and release to deflate. Four or five inflations per minute are ordinarily sufficient.

The cases here reported were taken at random from those treated in Sibley Hospital, Washington, D. C., and are cited merely to give an idea of the results.

CASE 1.—Cesarean section. Baby cyanotic. Pulse 60. For fifteen minutes artificial respiration and other methods of resuscitation were employed unsuccessfully. With first inflation by apparatus, color and pulse improved. Respiration established in five minutes.

CASE 2.—Normal delivery. Born 3:30 P.M. Heart slow. Oxygen first administered at 3:45 P.M. after unsuccessful attempts at resuscitation by other means. First respiration at 3:52 P.M.

CASE 3.—Normal delivery. Pallid. No respiratory efforts or discernible heart action. Inflation started about five minutes after birth. In one minute heart action was seen, and in ten minutes respiration was established.

CASE 4.—Normal delivery. Pallid. No heartbeat heard or felt. Usual methods of resuscitation used for fifteen minutes. First respiration seven minutes after oxygen was started.

CASE 5.—Manual rotation and midforceps after thirty-hour labor. Pallid, heart slow, faint and irregular. Oxygen started immediately. Heart action became strong and regular, color became pink, but no respiration for forty-five minutes. Infant showed symptoms of intracranial pressure, but fully recovered.

CASE 6.—Normal delivery. Cyanotic. Heart action weak and failing. Following ten minutes of trial by other methods, breathing began after three or four inflations with oxygen.

CASE 7.—Normal delivery. Rapid labor. Pallid. Heart action scarcely discernible. Oxygen started in five minutes. Color and pulse improved immediately, and after four or five inflations infant cried.

CASE 8.—Normal delivery. Cyanotic. Attempts at respiration were merely shallow gasps. Much thick tenaceous mucus. After a few inflations normal respiration was established.

CASE 9.—Low forceps. Large amount of mucus which could not be removed. Heart action fair at birth but gradually failed. Alternate inflations and attempts at removal of mucus by posture. First respiration twenty-one minutes after birth.

CASE 10.—High forceps. Pallid. No evidence of cardiac or respiratory action. Resuscitation attempted by all usual methods. After thirty minutes, efforts were discontinued. One hour and fifteen minutes after birth, oxygen was first administered. Within five minutes heart action was seen, and color became pink. First respiration thirty minutes after inflations were begun. This infant died fourteen hours later.

#### CONCLUSIONS

The apparatus has been in use about one year, and during this time many patients have been treated by various doctors, internes, and nurses, without previous experience. Both oxygen and carbon dioxide have been employed with no apparent difference in results. Further research is being carried on in an effort to determine the comparative value of these two agents.

The apparatus is simple to operate.

It is reliable, never once having been out of order.

It supplies oxygen promptly and effectively to the lungs of the patient.

The upper air passages are always kept clear by use of this new type face-piece.

Experiments on fresh cadavers have shown that the maximum pressure delivered by the apparatus is insufficient to rupture the air vesicles of the lungs.

1615 KENYON STREET, N. W.

## A PELVIMETER FOR THE DIRECT MEASUREMENT OF THE TRUE OBSTETRIC CONJUGATE

By JOSEPH T. SMITH, JR., M.D., CLEVELAND, OHIO

(From the Clinic of Cleveland Maternity Hospital and Western Reserve University)

WITH the desire of developing an instrument which would measure the true conjugate directly, the device illustrated in the accompanying pictures is suggested for trial.

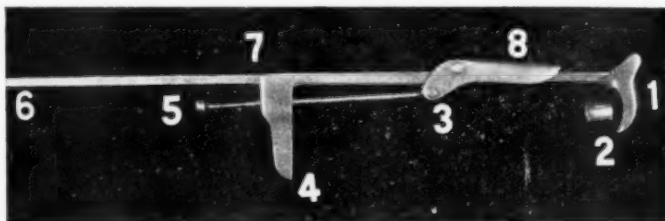


Fig. 1.—Pelvimeter folded for introduction.

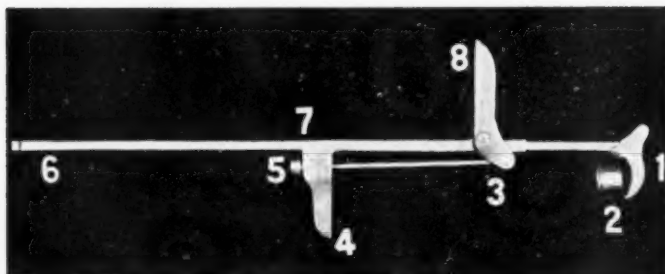


Fig. 2.—Pelvimeter arm raised for measurement.

This instrument consists of a small but rigid square steel bar, carrying a saddle-shaped piece (1) at one end. (Fig. 1.) At (2) is a thimble for the middle finger. On this bar, a sliding sleeve (3-7) is controlled by the handle (4). Back of this handle, a button (5) actuates a rod which raises an arm (8) at right angles to the bar (1-6) when the button is pushed in as far as it will go. Centimeter calibration marks on the upper side of the bar are read at the point 7, where the end of the sliding sleeve (3-7) cuts the bar.

The pelvimeter is made as slim as possible, and when the arm (8) is folded down, the whole device is about the diameter of a man's finger. Thus, it may be carried into the vagina without causing pain.

In use, the middle finger of the examining hand is slipped into the thimble at 2. The instrument, well lubricated, is carried into the vagina by the middle and index fingers. The examiner then locates the promontory of the sacrum with the middle finger, which may be slipped out of the thimble temporarily for this purpose. The procedure is exactly the same as that described in standard textbooks for the measurement of the diagonal conjugate. With the middle finger in the thimble (2), the saddle 1 is now seated over the sacral promontory. The other hand,

grasping the handle (4), slides the sleeve within the vagina, with the arm (8) folded down. The handle (4) does not enter the vagina. Pressure on the button (5) with the thumb raises the arm (8) to a right angle. Holding it firmly in this position, and with the bar firm against the under surface of the pubic arch, the handle (4) is drawn outward until the arm (8) is pressed firmly against the posterior surface of the os pubis. (Fig. 2.)

The instrument is then read directly at the last figure showing under the sleeve at the point (7). This calibration is not calculated straight along the bar (1-6).

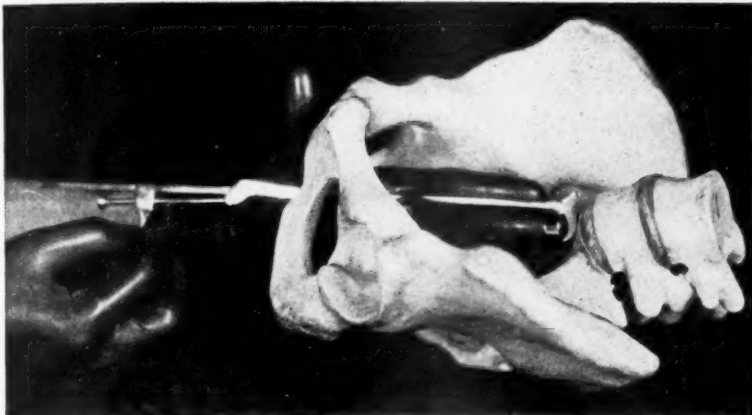


Fig. 3. Introducing folded pelvimeter.

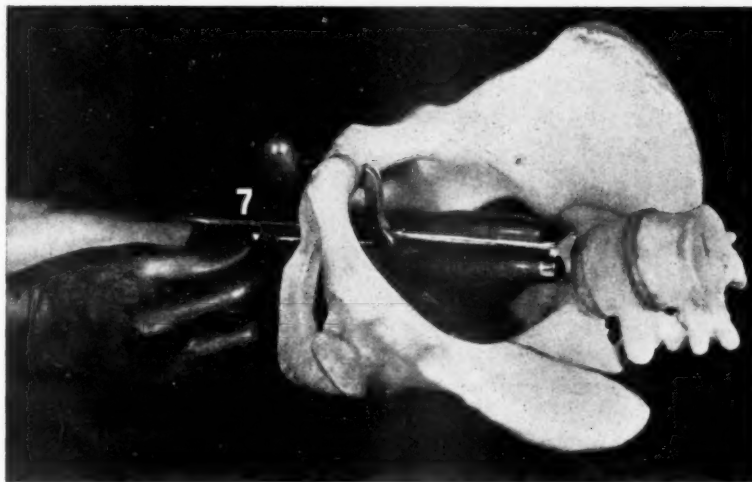


Fig. 4.—Arm raised, measuring.

The figures represent the distances from the point (1) in the curve of the saddle, i.e., from the point where that touches the sacral promontory, to the point 2.5 cm. up the arm (8), i.e., the point where numerous measurements teach us that the arm generally touches the most posterior point of the os pubis. In other words, the scale gives the length of the imaginary hypotenuse (8-1) of the triangle (1-5-8). That hypotenuse, when the instrument is in place, is the true obstetric conjugate, and its length may be read directly, on the scale at 7.

A slight pull on the button (5) now folds down the arm (8), and the instrument may be removed easily and painlessly.

I wish to thank Dr. Arthur H. Bill for his encouragement and for permission to test out the instrument on many patients in the clinic of the Cleveland Maternity Hospital. I also wish to acknowledge the interest and intelligent cooperation of Mr. George Guilford, who made the instrument, following a model.

2429 PROSPECT AVENUE.

### REPORT OF A CASE OF BICORNUATE UTERUS

BY E. C. STEINHARTER, M.D., AND SAMUEL BROWN, M.D.

CINCINNATI, OHIO

**F**ULL-TERM pregnancy in a bicornuate uterus is probably not so uncommon as the paucity of the literature on the subject and the experience of the busy obstetrician would lead one to believe. The reason for this is that the condition can occur without being recognized, since gestation, labor, and puerperium may all be uneventful. In rare cases, however, according to Williams,<sup>1</sup> the nonpregnant horn may partially fill up the pelvic cavity and give rise to a serious dystocia similar to that produced by tumors of other origin.

The following report is that of a patient who had a series of full-term normal confinements before it was discovered that she had a bicornuate septate uterus. In this particular case the positive diagnosis was made by x-ray, aided by lipiodol and later confirmed by exploration of the uterus from below and inspection of it intraabdominally.

I. F., aged thirty-three years, housewife. Her chief complaints were: skipping a period from time to time and pain in the lower abdomen. Past history was negative, except for general debility during past year.

First pregnancy was a miscarriage at three months, followed by three normal full-term pregnancies and then an incomplete abortion at four months, for which she was curetted. The gynecologist at this time apparently failed to observe a uterine septum. Catamenia at seventeen years. Dysmenorrhea the first day. Periods regular until recently, lasting five days with profuse flow. In the past year the menstruation has become irregular, the periods occurring at intervals of from 4 to 8 weeks.

For a few months prior to being referred to one of us (E. C. S.) for gynecologic examination, the patient had been under the care of an internist because of general debility, poor appetite, and pain in lower abdomen, especially on the right side. She stated that she had skipped a period due twenty days before, but did not consider herself pregnant. Bimanual examination revealed a slightly enlarged irregular uterus. In the right vault, low down, there was a tender sausage-shaped mass about the size of a nulliparous uterus, and it moved with the cervix and the uterus.

<sup>1</sup>Williams: Textbook on Obstetrics, New York, 1906, D. Appleton & Co., p. 110.



Radiographic examination at this time revealed a pregnancy in a bicornuate uterus. (Fig. 1.) It will be observed that the two horns did not undergo equal hypertrophy. As the general condition of the patient was poor, interruption of pregnancy was considered, but finally decided against when the patient began to show improvement in health. From time to time during gestation she was examined bimanually, but no enlargement of the nongravid horn could be made out. Two hundred and twenty days after the roentgenographic examination, the patient delivered herself by precipitous labor of a full-term normal baby girl weighing five pounds, four ounces. The obstetrician in charge reported nothing unusual about the pelvic organs. The puerperium was uneventful.

Four months after delivery another roentgenographic examination was made. The uterus at this time was also examined digitally and by uterine probe, and the septum was felt to be a definite continuous partition, extending from the



Fig. 1.—Radiogram of a two months' pregnant bicornuate uterus, showing gravid and nongravid horns.

fundus to just above the internal os and spreading out fanwise from below upward. Eight months after delivery the patient was operated upon (by E. C. S.) for appendicitis. The appendix was found to be subacutely inflamed. Advantage was taken of the laparotomy to inspect the uterus. It was found to be saddle-shaped at the fundus, and the area from the fundus to the cervix, uniting the two horns had the appearance of a raphé. It seems that such a uterus falls into the classification of uterus bicornis unicollis septus duplex.

*Comment.*—Although the introduction of iodized oil into the pregnant uterus in this case did not induce abortion and Heuser<sup>2</sup> reports a similar experience in a series of gestating cases in which interrup-

<sup>2</sup>Heuser: Bull. et mém. Soc. de radiol. méd. de Par., 1925, xiii, 126.

tion of pregnancy was indicated nevertheless we wish to emphasize that for the diagnosis of early normal pregnancy the roentgenographic method involving the injection of iodized oil into the uterine cavity should not be used, notwithstanding this apparent harmlessness to both the mother and the fetus. The method should be reserved for the diagnosis of early pregnancy in those patients suffering from conditions which would contraindicate the continuation of pregnancy if the latter existed. In the above case the unusual findings on pelvic examination, the seeming improbability of the existence of pregnancy, and the very poor general condition of the patient prompted us to employ the radiographic method for arriving at the diagnosis.

505 DOCTORS BUILDING.

### A CASE OF LIVER PRESENTATION IN SEVEN AND A HALF MONTHS GESTATION

By E. S. GURDJIAN, M.D., PH.D., ROCHESTER, N. Y.

(From the Obstetric Service, Rochester General Hospital)

IN THE differential diagnosis of placenta previa, especially of the marginal type, one should also consider a very rare condition; namely, the presentation at the external os of abdominal contents (especially the liver), in fetuses with a ventral hernial sac. Such a case was noted in Doctor Brown's Clinic, of the Rochester General Hospital.

Mrs. R. M. was treated at this hospital for syphilis and epilepsy previous to her pregnancy. After an intensive course of treatment her Wassermann reaction became negative. She was married December, 1926. At the prenatal clinic it was found that the pelvic measurements were normal. Her last menstrual period was December 16, 1926. She gave no history of previous pregnancies or miscarriages. On August 1, 1927, she complained of slight bleeding from the vagina. On August 3, at 6 A.M., she was seized with pains over the back and the abdomen, and at this time also passed some blood-tinged fluid. She came to the clinic on the same day, and it was found that the cervix was barely dilated to the extent of one finger. No typical contractions were observed. The fetal heart was not heard. The patient was advised to go to bed and rest. In the evening of the same day her pains became worse, and she was admitted to the ward and given  $\frac{1}{4}$  grain of morphine. At this time also the fetal heart was not heard. About 12 P.M. the cervix was found to be dilated three fingers' breadth. A boggy, spongy mass was felt at the external os, to the right of which a flexed small part was also noted. The vaginal examination was followed by bleeding. The question of a marginal placenta previa was kept in mind, and the patient was closely watched. At 3:55 A.M., August 4, the membranes ruptured, and at 4 A.M. the cervix was found to be fully dilated. The same spongy, boggy mass was presenting at the outlet, with a flexed knee to the right. The vaginal manipulation was again followed by bleeding. Because of the possibility of a placenta previa, it was thought advisable to extract the fetus as soon as possible. When the presenting part was extracted far enough to be seen, it was noted that it overlay a group

of intestinal coils. The mass was then recognized as liver. The extraction was continued, and the head was delivered by the maneuver of Ritgen. About half a minute after the delivery of the fetus, the placenta was expressed.

Examination of the fetus showed the head to be well formed. Anterior and posterior fontanelles were present and normal. The cornea of the eye was opaque and the pupil was not visible, the latter probably being due to the presence of the pupillary membrane. The thorax did not present anything abnormal. The anterior abdominal wall was found deficient. Instead, one could note the presence of a sac which extended from the anterior aspect of the abdomen, continuous with the peritoneal cavity, to the margin of the placenta. The proximal end of this sac contained all of the abdominal viscera, the most prominent of which was, of course, the liver. The surface of the latter organ presented for examination two areas of erosion (this was probably responsible for the vaginal bleeding). Posteriorly in the region of the sacrum there was a large myelomeningocele, distended with fluid. The perineum did not present an anal opening. More anteriorly in the perineum there was found a small tubercle, which was identified as the genital tubercle. No sex could be determined—an arrest of development rather than a condition due to the age of the fetus. The upper extremities were found normal, the lower extremities were markedly deformed, and the feet were clubbed. The umbilical cord was about 25 cm. long and lay in the wall of the hernial sac.

The interesting thing in this case was that the fetal liver presented at the cervix. Extroversion of abdominal viscera is a relatively common monstrosity and a well-described entity in literature, but the fact that such extroversion may very rarely be important in the differential diagnosis of placenta previa should be emphasized. In their text on *The Difficulties and Emergencies of Obstetric Practice*, 1915, Berkeley and Bonney mention this point. Extroversion of the liver may be differentiated from placenta previa by the following facts: (1) the bleeding, being fetal, is less in amount; (2) the mother feels well and does not present the sequelae of hemorrhage, and (3) the fetus is usually dead, due to the malformation and fetal hemorrhage.

## Society Transactions

### CHICAGO GYNECOLOGICAL SOCIETY

MEETING OF APRIL 15, 1927

DR. J. B. DELEE reported a case of **Pubiotomy**.

Mrs. N., age twenty-nine, an instructor in athletics. Over term 5 days; in labor 33 hours; almost complete dilatation for 12 hours without progress. The head was engaged, occiput 1 cm. below interspinous line, position occiput left transverse; labor completely arrested for 12 hours. Attempts at forceps had been made by two operators without avail. Forceps again applied, 2 tractions failed; left in situ; pubiotomy selected in preference to low cervical cesarean because there was a question of the viability of the child; the heartbeat was regular though slow. Membranes ruptured 28 hours before. Numerous examinations and two operations had been attempted. Three Dührssen's incisions had been made in the cervix. It appeared that just a little more room in the pelvis would permit delivery. The head was fully engaged and rotated readily in the forceps.

The sawing of the bone was easy but no separation of the ends occurred and using all legitimate abduction of the thighs in extreme flexion it was possible to obtain only 12 mm. separation of the ends. Delivery by forceps was easily accomplished. The baby, weight 3300 grams, succumbed in a few hours. No autopsy permitted.

Repair of the perineum with silkworm gut figure of eight sutures. A small hematoma of left labium suppurated. Moderate degree of phlebitis began on the seventh day. Left hospital on thirtieth day. Examination after 2 months shows thickening of the periosteum over the left sacro-iliac joint and to some degree on right. Locomotion good. X-ray clearly showed a transversely contracted pelvis.

#### DISCUSSION

DR. J. L. BAER said he had seen many pubiotomies in Vienna, where it was quite the vogue in 1907. There were literally dozens of women who had been operated upon at varying intervals previously. He saw every conceivable kind of trauma; huge hematomas of the labia, perivaginal infections, vesicovaginal fistulae of enormous size. He saw women whose pelvis had been widely separated, many with a resulting waddling gait. There was rarely a bony, simply a fibrous, union. Trauma seemed to be in direct proportion to the time of extraction of the fetus after pubiotomy had been done, so it appeared that when pubiotomy is indicated, it is wise to let labor progress spontaneously to an outlet level, instead of doing an immediate forceps extraction. That was the added blow which produced many of the injuries, infections and tears following pubiotomy. His observation and experience with it, led him to place it in the category of rare operations.

DR. DELEE, in closing, said the head was fully engaged. The bones did not part because there was synostosis of the sacro-iliae.

Transversely contracted pelvis are not very rare, as he had found quite a few that were contracted in the narrow pelvic plane.

With reference to Dr. Davis' remark about the position of the head at the beginning of labor, he said he was called in when it was in the pelvis in the transverse diameter.

The second question as to whether athletic instructors always have trouble and why, he couldn't answer, although he believed that women who have been very active in athletics have narrow arched pelves with firm bones that do not soften up so much during labor. Their perineums are rather deep.

In answer to Dr. Holmes, he said he did not know how the baby was going to do. It was alive, not dying by any means, which brings up the very important question of a craniotomy on a live baby.

He agreed that too many pubiotomies and too many cesarean sections are done on poor risks. He was certain that were this case treated ten years ago, he would not think of doing a pubiotomy. Kuestner in Breslau has done 230 cesarean sections of the low extraperitoneal cervical variety. He operates whether the women have been examined or not, even with fever, so long as the baby is alive. He believes in doing cesarean section rather than sacrifice the baby's life.

Here was a case in which Dr. DeLee was sure the baby was not dead, and only a slight enlargement of the pelvis was needed. That was one of the reasons why he chose pubiotomy in preference to low cervical section, and the event proved the correctness of the assumption. The fact that Dürrssen incisions had been made was a very prominent factor. The element of infection would not have deterred him from a low cervical because she was in the hospital and all the manipulations had been done in the hospital.

DR. W. C. DANFORTH read a paper on the **Immediate Repair of Cervical Injuries After Labor.** (See page 505.)

#### DISCUSSION

DR. C. S. BACON believed that Dr. Danforth was right in his contention that the cervix should be repaired when there is any tear of considerable extent and also right in warning against the general adoption of this procedure unless he is quite sure of the ability of the physician who is not an obstetrician to avoid infection. He emphasized the possibility of determining whether a tear is going to occur. Dr. Danforth found that about one-third of all the cases that were torn needed some repair. He thought it could be determined during labor which are the cases that are likely to be torn. There is an indication as to whether the cervix is liable to be torn in what takes place at the end of the first stage of labor. If there is no bleeding there is probably no tear. If there is considerable bleeding which persists during several contractions and sometimes continues for an hour or more, almost surely there will be a tear because one is dealing with a hard cervix, not fully dilated. These are the cases which should be examined. If there has been absolutely no "second show," no sign of bleeding, there probably has been no tear and it is not necessary to expose the cervix and run the risk of an infection at this time.

The introduction of the first suture in the case of a rather deep tear may be better done by tying it from the inside of the cervix rather than from the outside. Better apposition is secured in that way.

DR. J. B. DELEE agreed with Dr. Danforth as to the importance of sewing up cervical lacerations. He also felt the way Dr. Bacon did about the apical suture of the cervix as a routine in all cases. The majority of cases that come in are already torn. The practitioner must be educated to do good obstetric surgery, which is a slow process.

He called attention to Dr. Titian Coffey's method. The eighth or ninth day after delivery, under morphine or gas he makes a regular Emmett repair of the cervix. He has done it for eight or ten years and reports that the women come



back with good cervixes. Once in a while they have a lochiametra but he gets them up and it disappears. He believes it prevents permanent damage to the cervix and pelvic connective tissues.

The French believe in the prophylactic cervical incisions. They say nature does not know how to make a dilatation of the cervix. Therefore as soon as the effacement is complete, the cervix is cut.

The frequency of cervical tears is much greater in his experience than Dr. Danforth finds it. He has seen deep cervical tears after very easy deliveries. It occurred to him that the Gwathmey method of anesthesia predisposes to cervical tears. Quinine in the rectal anesthetic, 20 grains, sometimes produces tempestuous uterine contractions, yet the woman suffers very little pain, while the cervix suffers laceration.

DR. CARL H. DAVIS believed that patients who have premature rupture of the membranes and then go on to complete delivery without the use of the bag are going to have more injury to the cervix than where the bag has been used. It would have been interesting if Dr. Danforth had reported in connection with these thirty-two cases how many heads were transverse and how many were occipitoposteriors. It is the experience of all obstetricians that where the head is in the transverse position there is a prolongation of the time before the cervix passes over the head.

He agreed with Dr. DeLee that there is some question regarding bringing the patient back to the operating room during the early puerperium. He would much rather send her back to the hospital some weeks later, after involution is complete and perform a trachelorrhaphy. Perhaps a great many of the small tears may be taken care of immediately and reduce the necessity for later trachelorrhaphy.

DR. C. B. REED abandoned the operation where the cervix was definitely swollen. In this case no allowance was made for the swelling and the stitches would get loose. On the other hand, where he made the stitches so tight as to allow for subsequent shrinkage, they would cut through. Sometimes, he made the repair on one side and let the other side alone. Many of these cases healed spontaneously. Others would be torn at the next delivery and it seemed probable that the attempt to repair the injury that was done was a waste of time. He could not say that enough was gained in the suturing operation to justify taking chances that lengthened the work. In fact, he believed that the opinion prevailing among obstetricians that the cervical repair should await the end of the child bearing period, is well founded.

DR. IRVING F. STEIN endorsed what Dr. Danforth said concerning the routine examination of the cervix after labor, and repair when the tear is of any magnitude. He maintained that a 2 cm. tear is sufficient to repair, but of course that was a matter of personal experience.

He did not know why Dr. Reed had the bad results reported. He uses the interrupted sutures referred to by Dr. Danforth tight enough for good approximation, but not tight enough for pressure necrosis. One of the requisites of cervical care after labor is first of all to examine in such a way that there is no undue pressure on the friable vaginal tissues. He found the McCormick retractors with the round ends and made of very springy steel, satisfactory for this purpose.

DR. JOSEPH L. BAER emphasized the effect involution has on the tear. When he demonstrates a cervix to the house staff, he points out that most of the tears that occur in spontaneous or moderately severe operative deliveries are tears that involve about one-fourth of the length of the full-term cervix, measuring from the external os to the top of the lateral fornix. The final depth of the tear is then measured in terms of the involuted cervix, that is, one-fourth of its length or

less. Eversion accompanying ordinary small nicks as Dr. Davis pointed out, can be taken care of with the office cautery.

In the cervix all the thickness and edema are anteroposterior and all the thinning out is in the sides. The extreme lateral angles are very thin and the attempt to approximate them with a stitch is practically futile. That shows the retracted musculature to lie between the endocervix and mucosa of the vagina so when the musculature is brought out there is again a substantial thickness. Unless the tear is a real tear the approximation might just as well be left to scar formation because the depth of that tear is never more than a nick of the cervix. Promiscuous repair can well do more harm than good.

DR. J. P. GREENHILL said he had had occasion to look over a fairly large series of sections of the cervix uteri of newborn infants. He found that on the sides of the cervix there was a definite decrease in the amount of muscular tissue. This may account for the fact that in many cervixes, there is much more thinning at the sides than there is in the anterior or posterior lip.

DR. G. F. HIBBERT said the question of cervical repair at the time of delivery recalled many cases that have come under his observation at the Central Free Dispensary. A large percentage of these were foreigners who had been delivered by midwives, and consequently had received no surgical attention at the time of their delivery. Perhaps their chief complaint was vaginal discharge, but very often sterility brings them to consult the doctor. In examining these women, a cervix is often found lacerated in several directions, oftentimes the tears extending far out in the lateral fornix. He often wondered whether these bad tears were not frequently a big factor producing sterility, but certainly the infections of the cervix could be minimized had these cases been repaired at the time of delivery. For this reason he agreed with Dr. Danforth regarding this subject.

DR. DANFORTH, in closing, said that many times one finds tears when no hemorrhage occurs. In his opinion the tear has to be rather deep in order to produce much hemorrhage. A tear two or three centimeters deep can be present without any serious bleeding.

He agreed with Dr. DeLee that tears can occur in normal labors. One woman mentioned in the paper had a tear on one side three centimeters in depth, without damage to the perineum.

He omitted from his figures the cases of manual dilatation because he wanted to show that tears occur when there is no traumatism.

He considered the point brought out by Dr. Stein as to gentleness in manipulation very important. In most of these cases, particularly the primiparae, one is dealing with an episiotomy which should be damaged as little as possible.

Some do not repair the cervix because they feel it may tear again. No surgeon ever made anything better than nature did in the first place. One does not use a similar argument to prove that an episiotomy should not be done on a primipara. That many times has to be incised again. The cervix should be in a healthy condition between labors even if sutures have to be used.

## MEETING OF MAY 20, 1927

**DR. SNYDER reported A Case of Pregnancy With Arterial Hypertension and Albuminuria, Premature Breech Delivery, Postpartum Laparotomy, Cholelithiasis, Pancreatitis and Glycosuria.**

The patient, twenty-two years old, para ii, was supposed to be at term March 3, 1927. She had had an uneventful delivery in her first pregnancy and came in early in her second pregnancy with a blood pressure of about 144. In December the pressure went up to 160/100. There was a trace of albumen. The patient was put to bed. There was a gradual increase in the blood pressure and an increase in the amount of albumen, and she was finally sent to the hospital on January 8 with a pressure of 180/112 and albumen 1.6 grams per liter. Within a few days the pressure was reduced to 130. On the 17th the albumen suddenly increased to 3.7 grams per liter with no change in the pressure. The output of urine was reduced to 300 c.c. daily with an intake of 1000 c.c. At this time the patient developed some epigastric pain which was thought to be a symptom of the toxemia. She had a breech presentation; went into labor and delivered spontaneously the night of the 17th. On the 18th she continued complaining of the epigastric pain but pulse and temperature were normal. The baby weighed two pounds and five ounces and lived about sixty hours.

This epigastric pain gradually increased over the gall bladder with distinct tenderness at this point. On the 19th the pulse and temperature gradually increased until about the middle of the evening the temperature was 102° and pulse 130. White cell count was 18,000. The same night the abdomen was opened and a straw-colored fluid found. On examining the appendix there was no very definite pathology. All the mucous membrane was slightly reddened. On the mesoappendix there appeared to be a small spot which was thought to be an area of fat necrosis. The appendix was removed. The mesentery and omentum were investigated and found covered with spots of fat necrosis. The pancreas was palpated and found to be thickened, enlarged and indurated. The gall bladder on palpation was found filled with stones. A drain was inserted down to the region of the appendix and another one to the head of the pancreas.

Ten or fifteen minutes after return from the operating room she was awake and the pulse had dropped to 108. Temperature gradually came down and she made an uneventful recovery. She was advised to have the gall bladder removed, and this was done on February 8. From this operation she likewise made an uneventful recovery.

The report on the catheterized specimen of urine received after operation showed a considerable amount of sugar. Had this report been received before operation it might have given the operator some idea of what to expect.

**DR. W. B. SERBIN**, by invitation, read a paper entitled, **A Report on 320 Postmortem Examinations on Feti at the Chicago Lying-In Hospital.** (This article will be published in the next issue of this Journal.)

**DR. EDWARD ALLEN**, by invitation, presented an **Analysis of Thirty-two Cases of Ectopic Pregnancy.** (For original article see page 540.)

## DISCUSSION

**DR. E. L. CORNELL** said that a posterior colpotomy was very good in a case in which a typical history or typical findings of ectopic pregnancy may be absent. Where there is a history of a missed period and irregular vaginal bleeding,

it seemed to him that it was not quite necessary to puncture or open the posterior culdesac since the needle is a very easy method of determining whether blood is present. He had tried it several times and was able to enter the posterior culdesac and withdraw the blood in cases of ectopic pregnancy. In one case with an atypical, subacute appendicitis he was able to obtain some fluid pus from the posterior culdesac, which of course ruled out the question of ectopic pregnancy but also determined him to open the abdomen and remove the appendix. In cases of ruptured corpus luteum cysts, which are not infrequent, this same method can be employed. The fluid withdrawn will be straw colored, in which event operation can be postponed until the symptoms and condition of the patient permit. He said it was interesting to hear that the removal of an ectopic pregnancy by the vaginal route is being advocated again.

DR. CAREY CULBERTSON said the report of Dr. Allen was very important, though based on a relatively small number of cases, because of the fact that posterior colpotomy is advocated. Removal by the vaginal route is not new because it developed in the early days of gynecologic surgery when almost everything was attempted from below. By 1898 Kelly had operated a considerable number of ectopic pregnancies by the vaginal route. Many surgeons today would favor this route but are afraid of approaching the pelvis from below. One reason for this is the fear of bleeding, since hemorrhages have followed posterior colpotomy. It is true that when the incision is made close to the external os there is more hemorrhage from the wound than if the incision were made a little higher up where the vaginal vault is free, in the rectovaginal septum. Naturally the incision must not be carried too far laterally into the broad ligaments. He has used this method a great deal and advocates it not only for diagnostic but for therapeutic purposes. Given a mass in the pelvis, the nature of which is uncertain, there is no objection to making an incision that will show what is there. A needle, of course, may be almost equally effective. If the blood is fluid it will run out; if it is clotted it will not. If it is pus, the abscess can be evacuated much better by incision; here the trocar is apt to be only diagnostic. If the transverse wound is not sufficient in size it is very easy to enlarge it by a median incision posteriorly which will give a great deal better access. Danger to the rectum is practically nil, provided the incision is not followed by drainage with the old-fashioned rubber tube. In hematocele drainage need not be maintained.

Another reason why men are afraid to employ this method is because they have not trained themselves to work in this constricted canal. Naturally if there is an extensive mass involving the whole pelvis, that will be a case for abdominal section. It must not be forgotten that occasionally one of these cases will prove to be such as not to come in Dr. Allen's series. He had seen six cases of ectopic pregnancy associated with infection and abscess. Where the pregnancy is an early one and where the tube is not markedly enlarged it is not difficult to remove it from below.

Dr. Allen brought out the importance of thorough exploration in his cases. Several times in operating on ectopic pregnancy Dr. Culbertson had removed tubes that were just as normal as tubes could be. Twice in one winter he came upon pelvic hematoceles with normal tubes and where the only evidence of fetal implantation was in the fimbriated ends. The tubes were normally patent. Tubes of that sort should not be extirpated. One old teaching was that both tubes should be removed in a case of ectopic pregnancy. This is no longer followed. He operated on a woman during the winter by the vaginal route for a left tubal pregnancy. She had been operated upon by the abdominal route in February, 1926, for a right tubal pregnancy.

In Dr. Allen's series there were only two or three emergencies, which bore out Dr. Culbertson's experience in ectopic pregnancy. That is why the diagnosis

clinically is often missed by the average doctor. He is looking for shock, collapse, and threatened death before he makes the diagnosis. In some of the recent statistics as high as forty per cent of the cases did not have amenorrhea. Very few of these cases are emergencies. The patient can be taken to the hospital and watched until properly prepared for operation at the regular operating period.

DR. C. S. BACON said in Dr. Allen's paper the question comes up as to how one can distinguish between hemorrhages from different causes and how to make the diagnosis. In the great majority of cases operation is necessary, though a certain number of cases of ectopic pregnancy take care of themselves. It is not demonstrated that every case of pelvic hemorrhage should be operated on; the important thing is to make the diagnosis. If the patient is in the hospital under control it is safe to delay operation in doubtful cases where the findings are not at all conclusive. He did not believe in puncturing. The question is if there is hemorrhage is it coming from an ectopic pregnancy and is it necessary to operate?

DR. CAREY CULBERTSON was asked to close the discussion as Dr. Allen had been called away.

The point of an unruptured ectopic having been brought up, he emphasized again that a colpotomy incision would make the diagnosis where a needle would not because there would be nothing to run out through the needle. Those are the cases that are most easily handled by posterior colpotomy. He had one during the winter, an unruptured tube, not larger than two and one-half or three centimeters in diameter, perfectly free, with no adhesions.

Dr. Bacon's suggestion about conservative treatment was excellent. Some of these patients get along just as well without operation as with it. Many of them are treated for pelvic peritonitis and pus tubes. There is a swelling bilaterally and they are not very sick and do not show much reaction. They are treated conservatively and get along very well. At the County Hospital it is the rule that cases of ectopic pregnancy go to the obstetric ward; as a matter of fact the larger number are sent to the gynecologic ward with a diagnosis of pelvic peritonitis or salpingitis. He teaches his students that with the presence of a mass in the pelvis, ectopic pregnancy should be thought of. If with the mass there is metrorrhagia, pregnancy is three times as probable. If in addition, there is pain, the diagnosis is almost certain. If, with all this there is a history of preceding amenorrhea, the diagnosis is made. He said that he had had two cases which taught him the value of posterior colpotomy. One patient had metrorrhagia and he did an exploration of the uterus to see why she was bleeding. There was no palpable mass. She was put back to bed and the next day she had pain. The pain continued and examination revealed a mass in the pelvis. He did a posterior colpotomy and found an extrauterine pregnancy. In the second patient he did a diagnostic curettage and removed a large amount of material from the uterus which looked like hyperplasia of the endometrium. He left that evening on his vacation. The patient went home at the end of a week. The day following discharge from the hospital she had severe pain and her husband called in the nearest doctor who operated by the abdominal route and found an ectopic pregnancy. Upon return from the vacation sections of the scrapings showed normal decidua. In this case posterior colpotomy would have been better than the diagnostic curettage.



# Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

## Collective Review

### THE OBSTETRIC LITERATURE OF 1927

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IN THIS year's review the attempt is made to analyze only a limited number of papers published during 1927 and to point out the essential ideas or facts presented in them.

#### PREGNANCY

*Physiology.*—The investigations of Krüger-Franke, Haagen and Oekel<sup>1</sup> reveal that during normal pregnancy the blood picture is similar to that of a mild infection, and during labor resembles that of a severe acute infection. Knaus<sup>2</sup> found that repeated injections of pituitary extract into pregnant rabbits early in pregnancy uniformly failed to disturb pregnancy, but injections given late in pregnancy invariably resulted in delivery. (These results may be paralleled in human beings; but if abnormal uterine contractions are present in the early months as in inevitable or incomplete abortions, pituitary preparations have a definite, stimulating action.)

According to Urner,<sup>3</sup> pregnant women may be vaccinated at any time during pregnancy without fear of obstetric complications. Lieberman<sup>4</sup> comes to the same conclusion but emphasizes that vaccination of the mother during pregnancy, resulting in a positive reaction, does not convey any specific immunity to the unborn infant. Slemons and Fagan<sup>5</sup> found a definite relationship between the mother's gain in weight during pregnancy and the baby's weight. In general the more the mother gained, the greater the weight of the baby at birth. Since Biehle<sup>6</sup> found a decrease in weight during the last few days of pregnancy in only 63 per cent of his cases, he cannot support Zange-meister's contention that a loss of weight toward the end of pregnancy indicates the early advent of labor. N. F. Miller<sup>7</sup> searched the literature for cases of pregnancy which followed inversion of the uterus, and analyzed 56 such cases. Among 25 manual corrections there were recurrences in subsequent pregnancies in 44 per cent, whereas among 22 cures by operation not one recurrence was noted. Among 29 confinements in the group corrected by operation there was not a single rupture of the uterus. While the results in cases corrected by operation are much superior in so far as future pregnancies are concerned, manual reduction should always be attempted first.

Miländer<sup>8</sup> added two more cases of pregnancy following inversion of the uterus.

Thoms<sup>9</sup> emphasizes the value of lateral roentgenograms of the pelvis to outline the vertical profile of the sacrum and the relationship that its promontory bears to the symphysis pubis. He<sup>10</sup> also discusses a simplified technic of x-ray pelvimetry. (Because of the ease and relative safety with which cesarean sections can be performed, pelvic measurements often are not as systematically nor as carefully taken as they should be. It is bad practice to permit a patient to go into labor without knowing everything about her pelvic bones and if the x-ray is necessary to complete the information, it should be used without any hesitation.)

*Abortion.*—Cultures were obtained by Nickel and Mussey<sup>11</sup> from the tonsils of one patient and from the teeth of three other patients who had had abortions. In three cases injection of these cultures into guinea pigs produced abortions. The causative organism was a green-producing streptococcus. Reith<sup>12</sup> injected green-producing anaerobic streptococci obtained from the tonsils and placenta of a woman who had had repeated spontaneous abortions into four pregnant rabbits and produced abortions in all of them. Vignes<sup>13</sup> reports a case of habitual abortion in which there was acute decidua infection during two of four abortions. In the fifth pregnancy streptococci were found in the gums of the mouth and in the vaginal discharge. An autovaccine was given to the patient and she went to term and delivered a living child. (These experiments of Nickel and Mussey, and of Reith support the contention made by DeLee more than twenty years ago that an infection may cause abortions.)

From an experience with nine cases, Fürst<sup>14</sup> comes to the conclusion that interruption of pregnancy by means of the x-ray is not a good procedure because in many cases the ovum is not completely expelled even after a long time, hence hemorrhage and infection may set in. On the other hand, Wyser and Mayer<sup>15</sup> found this method of producing therapeutic abortion a very satisfactory one.

Several authors have recently expressed the opinion that where a pregnant uterus is inadvertently radiated, the pregnancy should be interrupted because of the probable harm to the fetus. Sachs<sup>16</sup> takes issue with this statement because he can show that in many instances perfectly normal babies were born after x-ray treatment was applied during pregnancy. Mundell<sup>17</sup> discusses this same question as well as that of cancer of the cervix complicating pregnancy.

For the treatment of septic abortion Kessler<sup>18</sup> advocates the use of quinine. Klein<sup>19</sup> studied in a large Russian clinic the effect of artificial abortions on subsequent labors and found that such abortions were followed in later pregnancies by more cases of adherent placenta, delay in the third stage, forceps delivery, abnormal presentation, placenta previa, eclampsia and postpartum hemorrhage. Atzerodt<sup>20</sup> studied the cases in the Giessen clinic but failed to find that abortions influenced subsequent labors. (The reviewer is inclined to believe with Klein that artificial abortion tends to cause disturbances in subsequent pregnancies and labors.)

Deaths due to hemorrhage from abortion were reported by Oing,<sup>21</sup> Bass,<sup>22</sup> Mandelbaum,<sup>23</sup> and Federlin.<sup>24</sup>

*Complications.*—Zinsstag<sup>25</sup> mentions that in the Aarau and Basle clinics all the fatal cases of heart disease during pregnancy were in

women who had mitral stenosis and he believes that pregnancy should be interrupted in cases of mitral stenosis regardless of whether or not signs of decompensation are present. v. Jaschke,<sup>26</sup> however, is of the opinion that interruption of pregnancy and sterilization are not justified in cases of mitral stenosis where there is complete compensation. These procedures should be resorted to only in cases of curable decompensation and lumbar anesthesia is to be used. Jensen<sup>27</sup> believes that in cases of mitral stenosis, the power of accommodation of the myocardium and not the narrowness of the stenosis, determines whether the patient can endure pregnancy and labor. In a series of 160 consecutive postmortem examinations on women who had died during pregnancy or the puerperium, Cruickshank<sup>28</sup> found eleven cases of acute endocarditis. These cases demonstrate the importance of sepsis in the causation of acute endocarditis in pregnant and recently delivered women. Hamilton and Kellogg<sup>29</sup> studied 215 patients with true cardiac disease. They believe ether is the anesthetic of choice and that the majority of cardiac patients are safest delivered with forceps. Corwin, Herriek, Valentine and Wilson<sup>30</sup> also advise the elimination of the second stage of labor by means of a forceps delivery under ether anesthesia. The results of their study indicate that pregnancy and labor when properly supervised are not a great menace to the safety or life of the average ambulant case of heart disease. (The wise obstetrician will always consult a heart specialist for the patients who have outspoken evidences of heart disease, because in patients who are not carefully watched, decompensation may set in suddenly, especially immediately after delivery. Local, infiltration anesthesia, aided by morphin or pantopon, should be used as much as possible, especially in the performance of cesarean section, episiotomy or forceps delivery.)

Hyman and Kessel<sup>31</sup> believe that all pregnant women should receive iodides throughout pregnancy as a prophylactic. (This may do harm.) Williamson<sup>32</sup> is of the opinion that no patient who has had a thyroidectomy should become pregnant for at least two years after the operation, even though her symptoms are alleviated.

It is the belief of Corbus and Danforth<sup>33</sup> that, since patients who have pyelitis during pregnancy show definite changes in the urinary tract after delivery, in some cases at least, this pathology must have been present before the pregnancy began. The acute attack of urinary infection during the pregnancy then would be due to aggravation of the original lesion by the pregnancy, or possibly to some additional obstruction by the pregnant uterus. (The specific gravity of the uterus is the same as that of the intestines, hence the uterus rarely compresses the ureters.) Sano<sup>34</sup> found that the sensitivity of the ureter to drugs is lessened during pregnancy and that disturbed innervation of the ureter has a close connection with pyelitis gravidarum.

In most cases pulmonary tuberculosis is made worse by the advent of pregnancy. This is evident usually in the first trimester and in the puerperium but not in the second half of pregnancy. Gross<sup>35</sup> believes that gestation should be interrupted only in the few cases where in the first three months there is no improvement under treatment.

Greenhill<sup>36</sup> discusses the question of operation during pregnancy and emphasizes that operations on gravid women especially in the early months, should be performed at a time which would correspond

with an intermenstrual period were the patient not pregnant; otherwise, abortion may result. In performing a laparotomy during pregnancy, the uterus should be handled as little and as gently as possible. After operation morphine should be given for a few days. According to Litzenberg,<sup>37</sup> ovarian cysts discovered during gestation, labor, or the puerperium with very few exceptions call for surgical interference at once.

Baumm<sup>38</sup> feels that the retroplacental blood is especially adapted for the Wassermann test, and is more sensitive than the blood from the arm veins, but Franken and Rothmann<sup>39</sup> believe that the Wassermann reaction of the maternal milk is just as reliable as that of the retroplacental blood.

Müller<sup>40</sup> found that the best results in the treatment of syphilitic pregnant women are obtained with a combination of salvarsan and bismuth. McCord<sup>41</sup> observed that 50 per cent of untreated luetic mothers had full-term, live babies whereas 75 per cent of the treated mothers had such babies. Contrary to the results of Moore and of Solomon, Belote<sup>42</sup> concludes that pregnancy does not seem to be a factor in the prevention of neurosyphilitic accidents.

Severe anemia in pregnancy is not uncommon in India as evidenced by the papers of McSwiney<sup>43</sup> and Balfour.<sup>44</sup> The former author believes that many cases are due to concealed syphilis while Balfour considers the anemia to be a toxemia due to the products of conception.

*The Toxemias.*—It is the opinion of Dieckmann and Crossen<sup>45</sup> that vomiting of pregnancy is due to a deranged metabolism particularly of the carbohydrates and for the treatment of the condition they give large amounts of glucose intravenously. Waters<sup>46</sup> obtained good results by giving glucose combined with insulin. Sachs<sup>47</sup> likewise had good results with insulin but he does not administer glucose at the same time because he believes the best results are seen when the patients have a mild hypoglycemia. (We must not forget that in the treatment of hyperemesis fluids are very essential. The value of insulin is debatable but one thing is certain, insulin should be used with great caution.)

Titus and Dodds<sup>48</sup> give excellent advice concerning the correct preparation of glucose solutions for intravenous use, and they point out the common causes and means of prevention of unfavorable reactions which occasionally follow the intravenous injection of glucose.

Johnston and Johnson<sup>49</sup> believe that the amines, especially tyramine, may be responsible for eclampsia, while Warden<sup>50</sup> advances the theory that the cause is a sudden accidental introduction of a considerable amount of amniotic fluid into the maternal blood stream. Young<sup>51</sup> believes that the eclamptic and recurring toxemias have a similar origin in a diseased placenta and that in both types the kidney lesion is secondary. Titus, Dodds and Willetts<sup>52</sup> have proved that the convulsions in eclampsia occur at a time when there is a "relative hypoglycemia" and are caused by sudden drops in blood sugar. Hence the use of insulin either with or without glucose in the treatment of this disease is unnecessary and contraindicated. Bokelmann<sup>53</sup> agrees with this opinion. Intravenous injection of hypertonic glucose solution as originally recommended by Titus now has a definite basis for its proved therapeutic value.

Siegel<sup>54</sup> contends that bromsulphalein is a valuable liver-function test and can be used to differentiate the various types of toxemia but

Cruikshank, Hewitt and Couper,<sup>55</sup> who studied many tests of hepatic function found that not one of them was of service for diagnosis or prognosis.

In a follow-up study, Corwin and Herriek<sup>56</sup> found that hypertension persisted for months or years in one-third of the cases of eclampsia, one-half of the cases of nephritic toxemias, and two-fifths of the cases of hypertensive toxemia. It is probable that pregnancy reveals rather than causes the disease. Nevermann<sup>57</sup> found that almost half the patients with eclampsia recover completely, but that in the other half some residue of the eclampsia remains especially in the form of headaches and memory disturbances.

Stander<sup>58</sup> has long maintained that there is a hyperglycemia in the toxemias. (Titus<sup>62</sup> and also Levy<sup>59</sup> found a hypoglycemia.) He noted that all inhalation anesthetics produced changes in the blood chemistry and in the liver which were very similar to those found in eclampsia. Hence he advocates the use of local or spinal anesthesia in cases of toxemia. Astley<sup>60</sup> also favors spinal anesthesia when performing cesarean section in toxemia cases. (Cesarean section under local, infiltration anesthesia is as easy as and certainly less dangerous than spinal anesthesia.) Stander also believes that insulin with a protective dose of glucose is helpful in cases of acidosis. Bland and Bernstein<sup>61</sup> urge the use of a salt-free diet in the treatment of pre-eclamptic toxemia. H. A. Miller and Martinez<sup>62</sup> strongly recommend the use of liver extract. Hoehenbiehler<sup>63</sup> is enthusiastic about the quartz lamp and Wilson<sup>64</sup> praises intravenous injections of sodium bicarbonate for toxemic patients. Lazard<sup>65</sup> again advocates the use of magnesium sulphate. (The reviewer is convinced that magnesium sulphate is a very helpful drug in the toxemias of pregnancy). Waldstein<sup>66</sup> reports a series of 117 eclamptic patients in which the maternal mortality was 1.7 per cent and the fetal mortality 10.1 per cent. He believes that at term or early in labor the treatment of choice is cesarean section. Llames-Massini<sup>67</sup> also favors surgical treatment in eclampsia and Stoeckel<sup>68</sup> claims that eclampsia should be treated in the same manner as a ruptured ectopic pregnancy, namely, by termination of the pregnancy. Freund<sup>69</sup> from a study of 321 cases of eclampsia likewise emphasizes that immediate delivery yields the best results. Williams,<sup>70</sup> however, agrees with Eden that after accouchement forcé, cesarean section is the least appropriate treatment of eclampsia. Since 1922 Williams has treated all his cases of eclampsia absolutely conservatively and his results have improved considerably. Rice<sup>71</sup> likewise found a decided reduction in mortality since the change to conservatism. (It is rather bewildering to find that one group of authorities claims better results with radical treatment and another group claims the reverse. Evidently the results in eclampsia depend upon more factors than the mere emptying or not emptying of the uterus. There is no doubt that in the past [and even now] a great deal of harm was done by accouchement forcé, and too much medication, venesection, gastric lavage, colonic irrigations, sweating and purgation. The general practitioner, especially in the home, will do best to trust nature for at least 90 per cent of the treatment. However, an obstetric specialist in a clean hospital will find that cesarean section gives the best results in a definite proportion of his cases, especially in primiparas who have large, viable babies, who are not



in labor, and who are having repeated convulsions. Local anesthesia should be used in nearly all cases of eclampsia where an anesthetic is necessary.)

#### LABOR

*General.*—Mayes<sup>72</sup> is of the opinion that the use of mercurochrome in obstetrics constitutes a valuable means of reducing the puerperal morbidity. (The reviewer agrees with Mayes. At the Chicago Lying-In Hospital gauze soaked in mercurochrome was packed into the uterus or lower uterine segment ten times and in eight instances no growth could be obtained from the gauze on culture media.) Ostreil<sup>73</sup> advocates the use of strychnine with other drugs for inducing labor at term. Mathieu<sup>74</sup> induced labor with castor oil, quinine and pituitary extract successfully in 96.7 per cent of 91 cases. Hofbauer, Hoerner and Oliver<sup>75</sup> introduce the intranasal application of pituitary extract for starting labor and claim excellent results. The possibility of withdrawing the drug as soon as the uterus passes into tetanic contraction makes the nasal application of pituitary preparations the safest method. (Nevertheless, even the safest method is not without danger. The patient must be closely watched and a can of ether should be near at hand. Even if the pledget is withdrawn quickly after the uterus becomes tetanic and the baby is born alive, some damage may perhaps have been done to the child's brain and symptoms may arise months later.)

Bourne and Burn<sup>76</sup> believe that small doses of pituitrin may be given with safety at any stage, provided there is no mechanical obstruction. (The graphic tracings of these authors are similar to those of Haskell and Rucker<sup>77</sup> whose conclusions were the reverse. In many tracings there was a prolonged tonic contraction with superimposed waves of contraction. These tracings undoubtedly indicate interference with placental circulation and hence danger to the child.)

An excellent discussion on the clinical signs of fetal distress during labor and the treatment is presented by Freed.<sup>78</sup> (It cannot be reiterated too frequently that the fetal heart tones should be carefully and constantly controlled throughout labor in the first stage as well as the second.)

*Analgesia and Anesthesia.*—According to Harrar<sup>79</sup> pain is greatly relieved in 85 per cent of cases by rectal ether analgesia. He believes the Gwathmey method is the safest and most effective manner of relieving the pains of childbirth yet devised. (The Gwathmey procedure is not entirely harmless. Babies are sometimes born asphyxiated, labor may be too rapid, probably because of the quinine, and cervical lacerations occasionally are the result, and the lower bowel may become irritated. Furthermore, some individuals not only question a synergistic action between morphine and magnesium sulphate but also believe the combination to be harmful occasionally. In spite of all these disadvantages, however, the Gwathmey procedure is a definite advance in obstetrics and should be used for selected cases.)

Gellhorn<sup>80</sup> points out the occasions for, and the technic of, using local anesthesia in obstetrics. Cosgrove<sup>81</sup> favors the use of spinal anesthesia for obstetric work, and C. H. Davis<sup>82</sup> discusses the available methods for obstetric analgesia and anesthesia. In the first stage he prefers heroin, with pantopon as the next choice. In the second stage intermittent analgesia with nitrous oxide or ethylene with oxygen has proved of greatest value.

*Complications.*—Rosenstein<sup>83</sup> emphasizes that strong bearing-down efforts before there is complete dilatation favor the occurrence of cervical lacerations. Coudert<sup>84</sup> also discusses cervical tears and DeLee<sup>85</sup> presents two new ideas in the mechanism of cervical lacerations during labor. He describes three different forms of laceration and their treatment. Schickel<sup>86</sup> believes there is an autonomic innervation of the cervix independent of that of the body of the uterus. For spasms of the lower uterine segment and cervix Fink<sup>87</sup> recommends expectancy to the general practitioner, and vaginal or transperitoneal cesarean section to the experienced obstetrician. Rucker<sup>88</sup> advocates adrenalin for the treatment of contraction-ring dystocia and he bases this recommendation upon hysterographic tracings and actual clinical experience with cases of contraction-ring dystocia. (Bourne and Burn came to the same conclusion in their work but they fail to mention Rucker's first observations<sup>89</sup> on adrenalin which were published in 1925. These observations are contrary to the old belief that adrenalin increases uterine contractions.)

Horner<sup>90</sup> analyzes 500 cases of bradytocia (slow labor), and gives very good advice concerning the treatment of such cases. Boorstein<sup>91</sup> reports six cases of separation of the symphysis pubis which were due to improperly directed forceps deliveries and Naujoks<sup>92</sup> reviews the literature on rupture and suppuration of the symphysis in spontaneous labor. A. B. Davis<sup>93</sup> reports 184 examples of rupture of the uterus which occurred in the New York Lying-In Hospital. Wilson<sup>94</sup> describes three cases of uterine rupture at the site of a previous cesarean scar while Doerffer<sup>95</sup> reports three and Thoma<sup>96</sup> one case of spontaneous rupture of the uterus. (Many things may be done to lower the incidence of rupture of the uterus but one is to perform the cervical cesarean section as a routine instead of the classic operation.)

*Operative Obstetrics.*—A report of 537 cases of gynoplastic repairs of old lacerations immediately following childbirth is made by Bubis<sup>97</sup> who is very enthusiastic about these operations. Titus<sup>98</sup> believes that episiotomy should be done if laceration appears inevitable. He also performs perineorrhaphy in multiparas immediately after labor if they have a relaxed pelvic floor and suffer an abrasion during labor. Cornell<sup>99</sup> gives in detail the technic of forceps delivery. Bachman<sup>100</sup> describes the use of the Barton forceps for which he believes there is a limited field especially in the rotation and traction of transverse arrests of the vertex in high and mid-pelvis. (These forceps like the Kielland forceps should be used only by an experienced obstetrician.)

Three cases of habitual breech presentation are reported by Reiprich<sup>101</sup> and a study of the fetal heart tones in breech presentations is presented by Biehle.<sup>102</sup> The latter found that whereas in head presentations there is a gradual slowing of the fetal heart for a few hours before delivery, in breech presentations there is an acceleration in the rate. The cause of this increase is stimulation of the splanchnic nerves produced by pressure of the baby's legs against the abdomen.

Gibberd<sup>103</sup> advocates prophylactic routine external cephalic version during pregnancy in cases of breech presentation. The same recommendation is made by Bartholomew<sup>104</sup> who believes the procedure is harmless and will reduce the incidence of breech deliveries 80-90 per cent with a corresponding reduction in fetal mortality and morbidity. Fruhinsholz<sup>105</sup> reports a case of fetal death following external version.

(There is no doubt that external cephalic version when properly performed is a most helpful procedure and will cause a reduction in fetal mortality.)

During 1925 one cesarean section was performed for every 217 deliveries in the city of Detroit, whereas in the hospitals of that city the incidence was 1 in 67.7 births. Welz<sup>106</sup> analyzed these operations and found a maternal mortality of 13 per cent and a fetal mortality of 11 per cent. The puerperal mortality rate for Detroit was 6.6 per 1000, while that following abdominal section was 130 per 1000. A similar study<sup>107</sup> was undertaken for the city of New Orleans by a committee of which King was chairman. During 1921-1926, in the hospitals of that city, 291 cesarean sections were performed and this represented an incidence of 1 in 56 deliveries. The maternal mortality was 16.1 per cent. However, in a total of 31 cervical cesarean sections there was not a single death. H. E. Miller<sup>108</sup> also reported these statistics but emphasized the fetal mortality which was 18.9 per cent. Montgomery<sup>109</sup> reports a maternal mortality of 16 per cent and a fetal mortality of 23.8 per cent in a series of classic cesarean sections. On the other hand, Schweitzer<sup>110</sup> had a maternal mortality of only 2.5 per cent and a fetal mortality of 4 per cent in 236 cervical cesarean operations. In a series of 159 operations Smith and Kelly<sup>111</sup> report a maternal mortality of 0.59 per cent. Thirty operations were of the cervical type and the one death occurred in this group. Constantinesco<sup>112</sup> found a mortality of 18.7 per cent for classic cesareans and 7.1 per cent for cervical operations. (The above figures demonstrate the superiority of the cervical operations.) Zangemeister<sup>113</sup> urges that cesarean section be performed early in labor because of the danger of infection. Wagner<sup>114</sup> reports four cases of cesarean section performed by the exteriorization method of Portes (it should be called the Gottschalk operation) but the results were not satisfactory. Phaneuf<sup>115</sup> reports a case and describes the technic of this operation. (This operation may be employed when the uterus is to be preserved and the only other alternative would be craniotomy on a living child. Where the uterus can be sacrificed with impunity, a Porro operation and not the exteriorization operation should be performed in definitely infected cases.) Solomons<sup>116</sup> gives his reasons for believing that the lower segment operation is the one of choice. A new method of performing cesarean section is presented by Brodhead, Langrock and Cassasa.<sup>117</sup> (This operation was done by Lestoquoy<sup>118</sup> in 1857.)

Phaneuf<sup>119</sup> reports 25 operations in which he employed the transverse cervical incision. (The transverse incision permits an easier extraction of the baby's head but the danger of hemorrhage from extension of the incision is greater than it is with the longitudinal incision.)

An excellent exposition of the question of cesarean section is given by Mosher<sup>120</sup> and the abuse of cesarean section is discussed by Jellett.<sup>121</sup> In 19 elective cesarean sections performed at the end of pregnancy and before rupture of the membranes, Harris and Brown<sup>122</sup> found the uterus to be uniformly sterile. The same was true of six cases in which the classic operation was performed within four hours of the onset of labor. However, in five patients on whom the classic section was performed six or more hours after the onset of labor, bacteria could be demonstrated in the lower uterine segment. These bacteriologic findings clearly show why the conservative section is safe only when performed at the time of election.

An analysis of 130 pregnancies subsequent to cesarean section in 96 patients is made by Rice.<sup>123</sup> There was only one rupture of the uterus. In a series of 41 repeated cervical cesarean operations Phaneuf<sup>124</sup> found perfect healing of the cervical scars and very few adhesions.

*Uterine Hemorrhage.*—Bill<sup>125</sup> proves the advantages of prophylactic blood transfusion and cesarean section in the treatment of placenta previa. In a series of 45 cases where transfusion and cesarean were not very frequent, the mortality was 11.1 per cent, whereas in a later series of 56 cases in which transfusion was frequently used and of which 71.4 per cent were delivered by cesarean section, there was only one death (1.78 per cent). Ramos and Basan,<sup>126</sup> and Ledoux<sup>127</sup> likewise believe that cesarean section is the ideal treatment for placenta previa. Frey<sup>128</sup> reports a mortality of 1.2 per cent in a series of 79 cesarean sections for placenta previa. Korthauer<sup>129</sup> found a maternal mortality of 6.9 per cent and a fetal mortality of 17.3 per cent for placenta previa treated by cesarean section and a maternal and fetal mortality of 11.9 per cent and 61.2 per cent, respectively, for those not treated by laparotomy. Brodhead and Langrock<sup>130</sup> favor version when the cervix is sufficiently dilated to admit the hand. Their maternal mortality was 10.9 per cent and fetal, 66.7 per cent. Irving<sup>131</sup> reports a maternal mortality of 3.5 per cent and a fetal mortality of 57.9 per cent in a series in which the methods of treatment were essentially metreurysis and Braxton Hicks version. Kerwin<sup>132</sup> points out the advantages of ligating the uterine arteries for the control of hemorrhage in placenta previa. (The above statistics indicate that cesarean section with the aid of blood transfusion is the best method of treating most cases of placenta previa.)

#### PUERPERIUM

*General.*—Very excellent and useful information concerning postpartum care is given by both Polak<sup>133</sup> and Watson.<sup>134</sup> (While most practitioners realize the importance of prenatal care, very few follow a routine during the postpartum period, either immediate or remote. A good deal of chronic illness may be avoided by proper postpartum care which should extend over a period of many months.)

*Sepsis.*—The biologic defense in puerperal infection is discussed by Findley<sup>135</sup> and special importance is attached to Hofbauer's study on the cellular defense in the parametrium. In a study of 221 deaths due to puerperal infection Hamblin<sup>136</sup> found that 59 per cent followed operative delivery and that 40 per cent of these were by cesarean section and 38 per cent by forceps. Brügelmann<sup>137</sup> studied 300 cases of puerperal sepsis. The mortality was 75 per cent and in 75 per cent of all the cases, metastases occurred. In 60 per cent thrombophlebitis was present. The organism most frequently found as the cause of the metastases was the anaerobic streptococcus putreficiens. Schwarz and Dieckmann<sup>138</sup> are likewise of the opinion that anaerobic streptococci play a considerable part in puerperal infection. However, they maintain that in most instances the infection caused by this organism remains confined to the endometrium, and that few of these cases develop thrombophlebitis when promptly treated. They believe that early in these infections, removal of the dead material from the uterus by a dull curette will do much to prevent the spread of the infection, and that in some cases of pelvic thrombophlebitis all the pelvic veins

should be ligated and the uterus and adnexa removed. (Most authorities believe such treatment to be meddlesome. The less done in puerperal sepsis the better.) Harris and Brown<sup>139</sup> describe a new organism, act. pseudonecrophorus, which may be a factor in the causation of puerperal infection. The studies of Téoumine<sup>140</sup> indicate that the blood platelets fluctuate regularly during the course of puerperal sepsis. An increase in number signifies strength in the protective mechanism, whereas a decrease in platelets indicates the reverse.

As soon as a puerperal woman shows signs of infection Thomson<sup>141</sup> gives alcohol in large amounts in the form of port wine, madeira wine, cognac and the like. In the Odessa clinic among 9458 labors there was only one death from sepsis. Brock<sup>142</sup> advises uterine irrigation with alcohol during the puerperium when fever is present and the infection is limited to the uterus. (How is one to tell whether the infection is limited to the uterus?) Andérodias and Balard<sup>143</sup> use local vaccination for the prevention and cure of puerperal infection. They place gauze saturated with vaccines into the uterine cavity and vagina.

#### THE NEWBORN

*Physiology.*—A human ovum approximately nineteen days old is described by Greenhill.<sup>144</sup> This is the youngest ovum reported in this country and the outstanding feature of it was the unusual amount of invasion of the decidua by the plasmodium.

DeLee<sup>145</sup> describes a watch and a clock devised as aids in counting fetal heart tones. Seitz<sup>146</sup> traced 680 children, half of whom were born spontaneously, up to their 14th year of life. He found a much higher death rate for the babies born by operative procedures even up to the end of the first year of life. Idiocy, epilepsy, paralysis and other afflictions seldom are due to prolonged, difficult or operative labors but are more often the result of bad heredity. (Many neurologists and pediatricians will take exception to the last statement.)

*Complications.*—Frey<sup>147</sup> showed that chloroform will relieve fetal asphyxia by relaxing the uterus. Waller<sup>148</sup> reports 80 cases of asphyxia in which chloroform was used. In 69 per cent, the heart tones returned to normal and the babies were born alive, spontaneously. In only 7.5 per cent was there a complete absence of effect and in these cases the cause of fetal distress was not severe uterine contractions but such factors as looping of the umbilical cord. A very interesting study on fetal cardiac arrhythmias is reported by Rihl and Weinzierl.<sup>149</sup> They attach greater importance to the character of the fetal heart tones than to their rate. Faint and dull sounds indicate danger. They report three cases of fetal arrhythmias which persisted after birth and they emphasize that when a fetal heart irregularity is detected at the onset of labor, when the pains are weak and the membranes are intact and the head is movable, interference is not indicated because the cardiac irregularity arises in the fetal heart itself and not from the processes of labor.

Schmitt<sup>150</sup> denies the existence of regular fetal respiratory movements in utero and Dyroff<sup>151</sup> agrees with him. In the treatment of asphyxia neonatorum, Hazama<sup>152</sup> advises the intraspinal injection of lobelin while Israel<sup>153</sup> advocates the faradic current.

Stocker<sup>154</sup> examined the eyes of 22 babies born by cesarean section and he failed to find any retinal hemorrhages such as are seen in babies born per vaginam. In addition to cerebral hemorrhage Hook<sup>155</sup> found that infection, especially pneumonia following aspiration of in-



fectured fluid is an important factor in death of newborn babies. A personal experience is recorded by Gellhorn<sup>156</sup> where the usual dose of quinine was followed by intrauterine death of the child. Two analogous cases were communicated to him by other observers. (The reviewer knows of two additional cases.)

Falls<sup>157</sup> discusses the pathogenesis of pemphigus neonatorum, while Mahon<sup>158</sup> and also Couvelaire<sup>159</sup> take up the subject of hereditary tuberculosis and the newborn of tuberculous mothers, respectively. Gammeltoft<sup>160</sup> analyzes the cases of syphilis in the Copenhagen clinic and comes to the conclusion that pregnant women with syphilis should be treated during pregnancy with salvarsan irrespective of the duration of the syphilis or whether the patient had been treated before pregnancy. In a series of 243 fetal autopsies performed by McCord,<sup>161</sup> the causes of death in the order of frequency was syphilis 57 per cent, cerebral hemorrhage and tentorial tears 13 per cent, prematurity 11 per cent, and toxemia of the mother 4 per cent. (The very high incidence of syphilis is explained by the fact that this report comes from a southern clinic where a large proportion of the patients are negroes.)

*The Placenta.*—Gold<sup>162</sup> found that before rupture of the membranes the reaction of the vagina was acid in 147 out of 152 cases and after rupture it was alkaline in every one of 167 patients. Fisher<sup>163</sup> tested 1400 patients in the same way but found the test to be unreliable in 3 per cent of the cases. If, however, the reaction is repeated at two-hour intervals and the reaction is acid both times the diagnosis of intact membranes may be made with certainty. Though the causes of the quantitative variation of the amniotic fluid are still unknown Taussig<sup>164</sup> believes that fetal monsters play a rôle in these changes. Sakuma<sup>165</sup> injected pigments into the ear veins of gravid rabbits and found that the passage of pigments into the amniotic fluid is not brought about by the excretion of the pigment on the part of the fetus but directly from the maternal body. Kosakae<sup>166</sup> found that the blood vessels of the placenta react to irrigations of pituitrin and adrenalin solutions in the same way as do the vessels of other organs. A very complete description of placenta circumvallata is given by Williams<sup>167</sup> who maintains that the essence of this abnormality lies in the restricted area of the chorionic plate, the folding of the membranes and the presence of a layer of decidua upon the extrachorionic portion of the fetal surface of the placenta. It is Siddall's<sup>168</sup> opinion that inflammation of the umbilical cord occurs frequently even where syphilis is satisfactorily ruled out.

#### MISCELLANEOUS

An editorial<sup>169</sup> is devoted to DeLee's view that child-bearing in the modern civilized woman has become an event in which many factors may be pathologic. Kosmak<sup>170</sup> discusses the fundamental training for obstetric nurses and proposes a condensed syllabus of theoretic and practical teaching. Ten lectures and ten practical demonstrations are outlined all of which can be given in a minimum of thirty hours. MacMurehy<sup>171</sup> informs us that in Canada the maternal mortality was 6 per 1000 of living births. Among the 1532 deaths, 418 were due to sepsis, 357 to hemorrhage, 344 to toxemia and 87 to long, hard labor. Of the 1532 women, 1302 had had no prenatal care. Mosher<sup>172</sup> takes up the question of maternal deaths and suggests certain practical remedies. Baker<sup>173</sup> discusses the prevention of both maternal and infant mortality and praises the Sheppard-Towner Law. Adair<sup>174</sup> re-

views Woodbury's report on maternal mortality. (All three authors lay great emphasis on the statement that the maternal mortality in the United States is higher than it is in almost any other civilized country in the world. Mosher says we are 14th from the top of 17 civilized nations in maternal welfare and that the only countries which have a worse record are Belgium, Spain and Switzerland. Baker informs us that we rank 17th among 18 nations and that the only country in which the maternal death rate exceeds ours is Chile. There is no doubt that the practice of obstetrics in the United States could and should be considerably improved but it seems not fair for authorities such as Mosher, Baker and Adair to broadcast that obstetrics in the United States is inferior to that in countries such as Russia and Italy. The fallacy in these statements lies in the fact that there is no international uniformity in collecting maternal morbidity and mortality statistics. Therefore, the death rates of the different countries cannot be compared. The Health Section of the League of Nations considered this matter important enough to call attention to it at the meeting of the American Medical Association which was held in Atlantic City in May, 1925, by posting a chart which bore the caption "International Incomparability of Mortality Statistics.")

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## Selected Abstracts

### Physiology of Pregnancy

**Wijsenbeek and Grevenstuk: Observations on the Movements of the Uterus.**  
Nederlandsch Tijdschrift voor Geneeskunde, 1922, ii, 2155.

Having observed the movements of the nonpregnant uterus of rabbits through a celluloid window sewed into the abdominal wall, these authors now observed the movements of the pregnant and puerperal uterus in the same way. Some animals were observed during the entire pregnancy, and it was found that the presence of the abdominal window in no way influenced the uterine movements. Observations were made with the animal on its back; these were not commenced until several days after the insertion of the window so as to exclude any influence the operation might have on the movements. In order to exclude any effect, such as fright, which the unnatural position might have on the animals, some were narcotized with urethan. It was observed, in fact, that excitement and similar psychic influences definitely caused a cessation of movement.

So long as pregnancy was not demonstrable, the movements were the same as those of the nonpregnant uterus, namely, regular slow peristaltic movements which traversed the uterus in both directions. After eight or ten days, when pregnancy was evident on account of definite swelling of the uterus, the movements decreased in frequency and became less ample, so that at the end of the second week they were practically absent.

In the second half of pregnancy, the duration of which is from twenty-eight to thirty days, there is again a change noticeable. At this time parts of the fetus are distinctly visible through the uterine wall, and the fetal movements may be readily observed. Such fetal movements as the drawing of a paw along the uterine wall usually excite uterine movements which move along the entire

length of the uterus. In the third week of pregnancy, the uterine movements again increase in number and amplitude, becoming stronger as pregnancy advances. The movements are again peristaltic in nature, but there are definite movements which take place over the dilated portions containing fetuses and do not extend to the nondilated portions. The movements of the two uterine horns are independent of each other.

In the case of a dead fetus, which is indicated by the more livid blue color of its dilated segment, the movements become much more violent.

Agreeing with de Snoo, these authors believe that the trophoblast has a definite inhibitory action on uterine movements, which recommence when the trophoblast has ceased to exist. In case the fetus dies, the trophoblast ceases to function earlier than when it disappears in the usual way. In this way they explain the fact that while movements are practically absent during the second week, they are quite active over a fetus which has died.

Preceding delivery, there was a series of active contractions corresponding to the period of dilatation in woman. During the period of expulsion the peristaltic movements traveled in both directions, being apparently somewhat stronger in the direction towards the cervix. In the reverse movements, the uterus seemed to advance, while the fetus remained stationary.

The puerperal uterus had a peculiar appearance. It was reddish, and during contractions, whitish yellow in color. There were present a number of longitudinal wrinkles or furrows as if the circular fibers were more firmly contracted. The movements again had the same characteristics as those of the nonpregnant uterus.

The presence of the windows and the corresponding defect in the abdominal wall in no way interfered with parturition.

R. E. WOBUS.

**Westman, A.: A Contribution to the Question of the Transit of the Ovum From the Ovary to the Uterus in Rabbits.** *Acta Obstetrica et Gynecologica Scandinavica*, 1926, v, Supplement.

The author first briefly reviews the topographic anatomy of the internal genital organs of different animals. Then follows an account of the different theories concerning the transit of the ovum from the ovary to the tube, and its transportation through the tube. By means of the abdominal window method, the author carried out investigations in rabbits. Observations were made on animals during their sexually quiescent period as well as during estrus and on fertilized animals. During the quiescent period, weak contractions were seen in the musculature of the mesotubarium, drawing the tube medially and caudally so that the ovary comes to be more or less enclosed in the bursa ovarica. Continuous contractions were also noted in the tubes.

During estrus fundamentally the same movements of tube and mesotubarium were observed, but the mesotubarial movements were very powerful and constricted the bursa ovarica considerably. The displacements of the tube and ovary caused the different surfaces of the ovary to slide along the fimbrial apparatus. Muscular contractions of the same type were observed twenty-four hours after fertilization, following which they became reduced in intensity and rhythm. They were considerably weaker during pregnancy than during the quiescent period.

The muscular activity of the tube and broad ligament is regulated by the ovary. The contractions are weak after castration or destruction of the ovarian follicles, and they are strongest during estrus, when ripe follicles are present.

Through alternate contractions and dilatations in the tube, a powerful suction is set up which draws ova that are present in the abdominal cavity into the tube. The transit of an ovum through the tube is probably chiefly due to the muscular contractions of the tube.

J. P. GREENHILL.



**Hirst and Long: The Early Diagnosis of Pregnancy by Methods of Precision: Further Observations on Sugar Tolerance Tests. Final Report.** The American Journal of Medical Sciences, 1926, clxxxi, 846.

In a review of the literature on the laboratory procedures for the early diagnosis of pregnancy, Hirst and Long have attempted to show the reliability of the several different methods. The first group of tests, embracing the Abderhalden reaction, Erede's anaphylactic reaction, Costa's novocaine-formalin reaction, Dienst's reaction, and the red blood corpuscle sedimentation test, purpose to prove the presence of a specific protein in the nature of a ferment circulating in the maternal blood. The second group, including the alimentary glycosuria test of Frank and Nothmann, the Roubitschek adrenalin test, and the phlorizin test, rely on the tendency toward glycosuria in the early months of pregnancy.

The writers consider the first group either as too complicated for practical purposes or unproved by further investigations. The Frank and Nothmann method has been somewhat modified and carried out by them in a series of 150 cases. Of 88 pregnant women 83 or 94 per cent reacted positively. In the 57 non-pregnant 92 per cent reacted negatively. They, therefore, conclude that: (1) The alimentary glycosuria test is the most reliable. (2) The test is as reliable as the Wassermann test for syphilis. (3) The test is useful and, if practiced routinely will aid appreciably in the diagnosis of pregnancy before the gynecologic signs appear.

WILLIAM KERWIN.

**Adlersberg and Porges: The Diagnosis of Pregnancy by Means of a Double Test of Alimentary Acetonuria and Glycosuria.** Medizinische Klinik, 1926, xxii, 1760.

The authors combined the alimentary acetonuria test with the alimentary glycosuria test to detect early pregnancy. The tests are performed as follows:

After a rich, mixed diet, the patient is placed for one day on a carbohydrate-poor diet, such as the following: 200 grams of meat, from 2 to 5 eggs, 50 grams of cheese, 100 grams of butter, black coffee, tea, broth, and green vegetables. The next morning the urine is collected and tested for acetone by means of the Legal test. Then the patient is given two rolls, the equivalent of 80 grams of white bread and tea with 10 grams of saccharine in it. One hour and again two hours later the urine is tested for sugar.

Thirty pregnant women and 24 nonpregnant individuals were tested. All of the pregnant women gave a positive acetone reaction and had glycosuria. Of the 24 control patients only 2 showed acetonuria and 3 showed alimentary glycosuria. According to the authors, these results indicate that their combined test is the best yet devised for the detection of pregnancy in the early months.

J. P. GREENHILL.

**Hellmuth, K.: Is the Interferometric Method of Diagnosing Pregnancy Specific in Its Present Form?** Klinische Wochenschrift, 1926, v, 2406.

The author made 723 interferometric examinations in 362 cases in order to establish a diagnosis of pregnancy. In 53 cases of pregnancy between the sixth and tenth lunar months, 138 tests were 53 per cent negative. In 192 patients who were definitely not pregnant as borne out by subsequent examinations, 359 tests were made and 170 or 47 per cent were positive. The author concludes, therefore, that the interferometric tests are of no value, either in establishing a diagnosis of pregnancy or in ruling out a suspected pregnancy.

RALPH A. REIS.

**Kleesattel, H.: The Diagnosis of Pregnancy and the Determination of Sex by Means of the Interferometer.** Klinische Wochenschrift, 1926, v, 796.

The author attempts to corroborate the reports of Hirsch, Ritterhaus, and Streek which claimed that over 95 per cent of cases were correctly diagnosed as

to the existence or absence of pregnancy and also that the sex of the child could be determined. In the first series of cases in which Kleesattel attempted to establish an early absolute diagnosis of pregnancy by means of the interfereometer, the results were absolutely unreliable. In a second series of 13 women in the last weeks of pregnancy, he attempted to establish the sex of the fetus. Forty-three observations were made, and the results proved to be correct in only 61 per cent. He, therefore, discards the interfereometer as a means of establishing the diagnosis of pregnancy or as a means of determining the sex of the fetus.

RALPH A. REIS.

**Ask-Upmark, M. E.: Is the Corpus Luteum Necessary for the Physiologic Completion of Pregnancy in the Human?** *Acta Obstetrica et Gynecologica Scandinavica*, 1926, v, 211.

At the Lund clinic in 1903, a bilateral ovariectomy was performed. One of the removed ovaries contained a true corpus luteum of pregnancy, but pregnancy was not suspected before the operation. However, 269 days after the operation the patient delivered a live, full-term child. This case, according to the author, proves without doubt that the corpus luteum is not necessary for the continuation of pregnancy. Since 1903, according to reports in the literature, 51 patients were operated upon during the first two months of gestation, and four of these castrations were done during the first month. In 17 cases there occurred interruption of pregnancy, but 9 of these were not positively as the result of operation. The remaining cases support the author's contention that the corpus luteum is not necessary for the maintenance of pregnancy.

J. P. GREENHILL.

**Bohnen, P., and Borrmann, K.: Studies of the Increase in Blood Volume in Pregnancy.** *Archiv fuer Gynaekologie*, 1925, exxvi, 144.

The authors used the Congo-red method of Griesbach and injected 10 c.c. of a 1 per cent aqueous solution of Congo-red intravenously and four minutes later removed 15 c.c. of blood from the other arm. This blood was defibrinated, centrifuged, and examined colorimetrically. The average in normal, healthy nonpregnant women was found to be 6.4 per cent. In normal healthy pregnant women, the blood volume was found to be 7.63 per cent during the first half of pregnancy, and 7.0 per cent at the tenth month. This decrease is probably due to the terminal increase in weight due to the increased edema.

RALPH A. REIS.

**Hellmuth, Karl: Determination of the Calcium Content of the Maternal and Fetal Blood Serum.** *Klinische Wochenschrift*, 1925, iv, 454.

The content of calcium in the fetal serum was in each case definitely higher than in the maternal serum. This difference is larger than can be accounted for by percentage of error of the Clark method. The age of the mother or the number of previous children do not alter the relation between the maternal and fetal readings.

ADAIR AND SAFFERT.

**Bock: The Calcium Content of Serum in Pregnancy, Labor, and the Puerperium.** *Klinische Wochenschrift*, 1927, vi, 1090.

Bock used the Kramer-Tisdell method of determining the amounts of calcium present in the blood serum in various stages of pregnancy, during labor, and also during the puerperium. This method is accurate and simple. In healthy nonpregnant women the average calcium content was 9.21 mg. per 100 c.c. of blood. In primiparae the average amount of calcium was 9.60 mg. per 100 c.c., in secundiparae 9.18 mg.; in the first stage of labor the average was 9.52 mg., in the second stage of labor 9.38 mg., in the third stage 9.23 mg., and between

the fifth and the seventh days postpartum, 9.57 mg. In the toxemias of pregnancy the calcium content averaged 8.73 mg. per 100 c.c.

From these determinations it is quite apparent that there is no change in the calcium concentration during the first pregnancy. The calcium contents drop at the onset of labor but not to the extent reported by Kehrer and others. It rises again during labor, and the changes during the first and second stages of labor are only slight. In the third stage and immediately thereafter the drop in serum calcium is marked. During the puerperium, however, the calcium gradually returns to normal. The author offers no explanation for the variations found.

RALPH A. REIS.

**Hetenyi, G., and Liebmann, S.: Examination of Calcium Regulation During Pregnancy.** *Medizinische Klinik*, 1925, xxi, 1929.

From a study of the blood of fourteen pregnant women the authors conclude that there is a diminution in the calcium content of the serum toward the end of pregnancy. The calcium which is in the blood of pregnant women is quickly taken up. This avidity may be due, first, to the calcium requirements of the fetus, and secondly, to a special affinity of the cells of the gravid woman. In a few cases there appears to be an increased renal permeability to calcium. The blood of the umbilical vein contains more calcium than that of the artery.

J. P. GREENHILL.

**Hellmuth, K.: Studies in the Distribution of Sugar in the Maternal and Fetal Circulation.** *Archiv fuer Gynaekologie*, 1926, exxviii, 11.

The author used the Folin-Wu method of sugar determination. In 48 determinations on pregnant women the blood-sugar values were found to be normal with a definite and marked tendency toward a hypoglycemia during the eighth and ninth months of pregnancy. In 18 of the 25 determinations made during labor, the blood sugar rose considerably, the highest being 22.8 milligrams per 100 c.c. of blood. This hyperglycemia of labor is found not only in whole blood but also in the component parts of such blood; i.e., in the serum, the plasma, and in the erythrocytes. The sugar content in those cases which showed less than 180 mg. per 100 c.c. of blood was distributed proportionately between serum, plasma, and erythrocytes. On the other hand, those cases showing more than 180 mg. of sugar had the excess sugar in the plasma.

The fetal blood-sugar content was always lower than that found in the maternal circulation, the difference ranging from 9 to 84 mg. There was always found, however, a definite parallelism between the maternal and the fetal blood-sugar content.

RALPH A. REIS.

**Scontrino, A.: The Free and Combined Blood Sugar in the Field of Obstetrics and Gynecology.** *Archivio di Ostetricia e Ginecologia*, 1926, xiii, 97.

In determining the amounts of free and combined blood sugar, Scontrino used the micromethod of Bang. He finds that: (1) During pregnancy (normal) there is an increase in the amount of the free blood sugar during the first six months, with a corresponding decrease during the last three months. It might be as high as 1.07 at the sixth month and 0.08 at the ninth month. (2) During delivery the free blood sugar is increased as high as 1.01. (3) During the physiologic puerperium there are slight oscillations in the amount of free blood sugar, but it soon returns to normal. (4) In pregnancy complicated by albuminuria, the free blood sugar is diminished, as low as 0.76. (5) In pregnancy complicated by eclampsia, there is an increase in the amount of free blood sugar only during the attack. Before the attack there is usually a hypoglycemia. (6) In those patients having malignant tumors, the value of the free blood sugar is within

normal limits. (7) In the premenstrual period there is an increase in the free blood sugar as high as 1.06 and during the period of flow there occurs a return to normal.

In regard to combined blood sugar, he concludes that: (1) In the normal pregnancies and puerperium, the combined blood sugar runs parallel with the free blood sugar: i.e., a slight increase during the first six months of pregnancy, returning to normal by the ninth month. (2) During labor the amount of combined blood sugar varies slightly but averages about 0.50. (3) In pregnancy complicated by a slight amount of albumin, there is a slight variation from the normal, but during pregnancies complicated by a large amount of albumin, there is a marked diminution, as low as 0.37. (4) In eclampsia there is an increase during the attack. (5) There is a slight increase in the puerperium if it is febrile. (6) In vomiting of pregnancy it is within normal limits. (7) In malignant tumors it is within normal limits. (8) In the premenstrual period there is an increase before the flow appears, paralleling the increase in the free blood sugar.

J. M. PIERCE.

**Enfinger, H., and Boder, C. W.: Pigment Metabolism of the Liver in Pregnancy.**

*Archiv fuer Gynaekologie*, 1926, cxxviii, 327.

The van der Bergh test was used, on account of its accuracy and simplicity, in determining liver function. There is no definite positive test in pregnancy, and the authors cannot concede a so-called "liver of pregnancy." The increased bilirubin content may be due to a changed function of the reticuloendothelial system. They do find, however, a "liver of labor," because over 50 per cent of the cases examined during labor showed a hyperbilirubinemia, which rapidly disappears during the puerperium.

A direct reaction by the van der Bergh method during pregnancy is indicative of a disordered liver function. In the toxemias of pregnancy, especially eclampsia and hyperemesis gravidarum, this test is an excellent prognostic aid, both as to severity and outcome of the condition present.

RALPH A. REIS.

**Grzechowiak: Capillary Pressure, Particularly During Pregnancy and in the Puerperium.** *Zeitschrift für Geburtshülfe und Gynäkologie*, 1924, lxxxvii, 128.

The author discusses the relationship which exists between capillary pressure and arterial pressure and describes various methods which have been devised to measure the former. His own measurements were made with the Kylin apparatus and showed an average normal value of 140 mm. of water in the nail-fold capillaries of the finger when the hand is held at a level 15 cm. below the clavicle.

In pathologic conditions there are marked variations from this normal. There is an increase in any condition of venous stasis, as in heart failure. In cachectic conditions, exhaustion and undernutrition, there is a decrease, and this also occurs in diabetes. In nephritis, although the arterial pressure is high, there is no change in capillary pressure unless decompensation sets in.

In pregnancy the capillary pressure is at first low; from then until the tenth month it is approximately normal; in the tenth month there is a striking decrease in pressure. After delivery there is a gradual increase in a number of days to normal or even slightly above normal.

In disease of the kidney during pregnancy the capillary pressure values are definitely and considerably increased. The same holds true for eclampsia. In these conditions, the increased pressure persisted for some time after the clinical manifestation had disappeared. This increased capillary pressure forms a simple mechanical explanation for the capillary hemorrhages which form so significant a part of the pathologic picture of eclampsia.

MARGARET SCHULZE.

**Runge, H.: Venous Pressure in Pregnancy, Labor, and Puerperium.** *Archiv fuer Gynaekologie*, 1924, exxii, 142.

The author modified the method of Moritz and Tabora by substituting an intravenous needle for the capillary tube, and determined the venous pressure by introducing the needle directly into the vein under consideration. This needle was connected to a manometer. He, therefore, overcomes a discrepancy due to capillarity which often amounts to a 10 per cent error. This investigation was undertaken to determine the presence and extent of circulatory disturbances in the lower half of the body during pregnancy and labor. He finds differences in pressure between the cubital veins and the veins of the lower extremity in non-pregnant women. During pregnancy, the pressure in the cubital veins was unchanged, but the pressure in the veins of the lower extremities was increased, whether the subject was standing or lying down. The author stresses this point as being important evidence that the gravid uterus exerts direct pressure upon the large vessels leading from the lower extremities. This stasis makes for varicosities, especially when there is a constitutional predisposition. There was no increase in venous pressure found during the period of labor except during the expulsive stage.

RALPH A. REIS.

**Carulla: Peripheral Venous Pressure in the Puerperal State.** *Revista Española de Obstetricia y Ginecología*, 1926, xi, 329.

In a small series of normal pregnant patients the author determined peripheral venous pressure as varying from 7 to 36 cm. of water, averaging 23.8 cm. This amounts to almost twice the average reading for the nonpregnant female patient, where the normal runs from 8 to 18 cm., with an average of 12. During the puerperium the figures were found to run from 8 to 19, averaging 12. From his study the author concludes that in normal pregnancy the peripheral venous pressure oscillates within wider limits than in the nonpregnant woman, and shows a marked tendency to run at a higher level. During the puerperium the pressure does not vary from the nonpregnant normal.

THOS. R. GOETHALS.

**Benda: The Influence of Menstruation and Pregnancy on the Permeability of the Meninges.** *Medizinische Klinik*, 1925, xxi, 1863.

The author verified the findings of Heelig that there is an increased permeability of the meninges at the beginning of menstruation. This is probably due to a hormone. Since the hormonal influence is much greater during pregnancy, Benda studied the permeability in 25 women early in pregnancy and in 100 women late in pregnancy. Three methods were used, the uranin, the Weil-Kafka hemolysin reaction, and the Walter bromine method. In the first half of pregnancy no change in permeability was found. However, in the second half of pregnancy, and especially during labor, there was a markedly increased permeability in most of the cases. The increase is more frequent and more pronounced in primiparas. The return to normal did not occur until from four to six weeks after labor. In the presence of toxemia of pregnancy the permeability was greater than is usual during pregnancy. The barrier which is broken down is most likely the wall of the meningeal blood vessels. If this be true, then this injury to the meningeal blood vessels is only part of a generalized injury to the capillary endothelium of the body, which Volhard, Farr, and others believe to be the cause of edema in pregnant women. Since the capillary system is an essential part of the reticulo-endothelial cell system which plays an important rôle in the protective mechanism of the patient, it appears that this protective mechanism can under certain conditions be unable to function.

J. P. GREENHILL.



**Sandiford, I., and Wheeler, T.: The Basal Metabolism Before, During, and After Pregnancy.** *Journal of Biological Chemistry*, 1924, lxi, 329.

The writers show that the total energy production of a pregnant woman increases slightly, beginning at the middle of gestation, and finally reaches a maximum of approximately 20 per cent above her basal value before delivery. There is definite evidence that the rate of heat production of a unit mass of tissue of the normal organism is not materially changed during pregnancy, but that such increases as occur represent the heat production of the newly formed protoplasmic tissue, composed largely of the fetus and to a less extent of maternal tissue.

GROVER B. LIESE.

**Mahnert, A.: Studies of the Effect of Iodothyroglobulin on Diuresis and Metabolism in Pregnancy.** *Archiv fuer Gynaekologie*, 1925, cxxvi, 125.

The author used intravenous injections of iodothyroglobulin to study the metabolic changes in pregnant women with edema. Normal pregnancies as well those associated with some type of disease were used, if edema was present, in order to ascertain the effect of thyroid extract therapy upon kidney function and metabolism. The results obtained were rather unsatisfactory, as only a moderate percentage reacted favorably. Uric acid, urea, and sodium chloride excretion was increased in both normal and pathologic cases. There was also an increase found in the serum cholesterol and a decrease in the serum albumin. This was later followed by a decrease in serum cholesterol.

Mahnert agrees with Kraus that there is a hypothyroidism during pregnancy and shows the similarity between hypothyroidism in the nonpregnant state and the disturbances of water balance and metabolism found in pregnancy following injections of iodothyroglobulin. The terminal loss of weight in pregnancy is a similar reaction to that following thyroid treatment and is probably due to the increased function of the fetal endocrine system and especially the fetal thyroid.

RALPH A. REIS.

**Klaften, E.: Internal Secretion, Basal Metabolism, and Protein Transformation in Pregnancy.** *Archiv fuer Gynaekologie*, 1927, cxxix, 66.

For the past two years the author has conducted experiments with various extracts of the glands of internal secretion and studied the effects of their injection during pregnancy. His experiments have shown that placental extract stimulates metabolism. Thyroid extract stimulates the metabolism in the pregnant woman to a greater extent than in the nonpregnant. This thyroid stimulation is of great therapeutic value in combating the decreased protein metabolism which is always found in eclampsia. This work, therefore, offers a rational therapy for the eclamptic patient and places the heretofore empiric treatment of eclampsia by means of thyroid extract on a scientific basis. Ovarian extracts have the least effect on metabolism in pregnancy.

In ten cases suffering from the menopause due either to panhysterectomy or to radiation castration, the basal metabolism was found to be between 20 per cent and 40 per cent below normal.

RALPH A. REIS.

**Garipuy, Lasalle, and Sendrail: Fetal and Thyroid Participation in the Elevation of Basal Metabolism During Pregnancy.** *Gynécologie et Obstétrique*, 1926, xiii, 172.

The basal metabolism is always elevated in pregnancy. The maximum elevation, occurring toward the thirty-eighth week, is about 35 per cent. Following delivery, there is a rapid drop to about 15 per cent on the third day and to normal

on the seventh day. Since there is a similar constant elevation in hyperthyroidism, some observers conclude that the elevation in pregnancy is dependent on increased thyroid activity.

Multiple pregnancies show more than the usual increase in metabolic rate. Delivery and intrauterine death of the fetus cause an abrupt fall of the rate to normal. These factors point to another agency; namely, the direct influence of certain products of conception, acting as hormones similar in nature to those causing lactation, etc., activating nutritive exchanges, mobilizing reserves, and favoring their fixation by the fetal organism. Elevation of the basal metabolic rate would be only one of the effects of this hormone action.

Tests were carried out on 16 pregnant women, after a very careful investigation to determine the slightest clinical signs of hyperthyroidism. In addition, the effect of 1 mg. of intramuscular adrenin (test of Goetsch) on the pulse rate, and of 1 c.c. of hypophyseal extract (test of Claude and Porak) were tried. These are very sensitive tests for hyperthyroidism. The basal metabolic rate was carefully determined and found constantly elevated. Only one case showed clinical evidence of hyperthyroidism, and this was the only case in the series which gave positive results in the further tests. Thyroid extract (20 mg. per day) was given by mouth in several cases without significant reaction. The oculocardiac reflex, which is rarely normal in hyperthyroidism, was normal in these cases. On the basis of these findings, the author concludes that the elevation of the basal metabolic rate is a function of the action of certain products of pregnancy, acting independently, and not through the medium of a hyperthyroid condition.

GOODRICH C. SCHAUFFLER.

**Mahnert, A.: Studies in Changes in Metabolism and Body Weight in Pregnancy.**

Archiv fuer Gynaekologie, 1924, cxxi, 620.

The author attempts to determine whether or not the increase in weight during pregnancy is due to a sparing of the nitrogen and to what extent the body components are involved in this process of nitrogen retention. Tests were made of the total metabolism in pregnant women from the fourth to the tenth lunar months, only those cases being studied which showed a gradual increase in weight. These cases showed a limitation of protein metabolism when fasting, and the oxygen combustion was decidedly decreased, since only 6 per cent of the calory requirement is furnished by the body protein. The oxidation of fats and carbohydrates was therefore greatly increased.

He then takes up the terminal loss in weight reported by Zangemeister and finds that it is due to an increase in protein metabolism, since it is not due to fetal loss in weight or to changes in water metabolism. He is unable, however, to determine the causes or the factors involved. He suggests that the cause may lie in the hypophysis and also in the possibility of a relationship between the tendency to eclampsia and nitrogen retention with a corresponding failure to lose weight.

RALPH A. REIS.

**Kemper, W.: Terminal Loss in Weight in Pregnant Women.** Archiv fuer Gynaekologie, 1924, cxxi, 604.

The method of Zangemeister for calculating the terminal loss of weight in pregnant women was used in this investigation. First, the average weight curve is established for normal pregnant women by calculating from the differences in the highest weights during the last weeks of pregnancy rather than by using the absolute weights. On this basis 98 per cent of all cases examined weighed less at the onset of labor than they did during pregnancy. The average loss in weight was one kilogram. This loss is maternal, since the fetus gains in weight

during the last few days. The author suggests, as the most simple explanation, an increase in the excretory function, the maternal organism excreting excessive fluids secreted during pregnancy. This latter may be due to the fact that the pregnant woman rests more during the last few days of pregnancy and this rest may stimulate the excretory processes of the body. The author also suggests that it may be due to lessened food intake, although he believes this to be less plausible, since the majority of women continue normal food consumption until the onset of labor.

RALPH A. REIS.

**Hirsch, R.: Concerning the Terminal Loss of Weight in Pregnant Women.**

*Monatsschrift für Geburtshilfe und Gynäkologie*, 1924, lxxvii, 266.

Zangemeister has maintained that the pregnant woman usually reaches her greatest weight the third day before the onset of labor and that in the last few days of pregnancy there is an appreciable loss in weight (about two and a half pounds) in 98 per cent of pregnant women. Hirsch studied 170 women to determine the validity of this statement. The patients were weighed daily without clothes and under identical conditions. The author found that the greatest weight was reached on the sixth day before labor and that from the sixth to the fourth day the weight remained stationary. Then there was a fall in the weight so that when labor began, the average weight was about one pound less than it had been five days before labor. Unfortunately this information cannot be used to detect the onset of labor, because while it is true as an average of a large number of patients, it does not hold true for patients as individuals. Many women with marked loss of weight do not go into labor, whereas patients in whom there is no loss of weight might do it. The author believes that the hypophysis, which becomes active at the beginning of labor, is responsible for the terminal reduction in weight. He cites a patient who weighed two hundred pounds and who was treated for menorrhagia by radiation of the hypophysis. By the eighth day after radiation the patient had lost sixteen pounds.

J. P. GREENHILL.

**Biehle, H.: Is the Loss of Weight at the End of Pregnancy a Sign of Impending Labor?** *Monatsschrift für Geburtshilfe und Gynäkologie*, 1927, lxxvi, 107.

The author selected forty healthy pregnant women who had no edema and no albuminuria and weighed them twice every week during the last few days of pregnancy and daily during the last eight days before the calculated date of labor. He found a decrease in weight in twenty-five cases (63 per cent), hence he cannot support Zangemeister's contention that a loss of weight towards the end of pregnancy indicates the early advent of labor.

J. P. GREENHILL.

**Krauter, R.: Renal Function and Pregnancy.** *Archiv fuer Gynaekologie*, 1926, cxviii, 467.

The author investigated the hydrogen-ion concentration of the urine in pregnancy in order to throw light on the regulating power of the kidneys on the acid-alkali equilibrium during pregnancy. He shows charts and graphs demonstrating the variations in the hydrogen-ion concentration of the urine during the various times of the day, during the different months of pregnancy, following various diets, and in cases of eclampsia.

The hydrogen-ion concentration is more stable in pregnancy than during the normal nongravid state. The administration of hydrochloric acid or of sodium bicarbonate failed to change this concentration of the urine during pregnancy, showing that the kidney function is impaired to the extent that the renal secretory powers are less flexible and less able to excrete excessive amounts of acid or alkali which may be present in the blood stream.

RALPH A. REIS.

**Keiffer, H.:** *The Physiology of the Amniotic Fluid.* Gynécologie et Obstétrique, 1925, xiv, 1.

By experiments on 60 newborn babies it was determined that icterus neonatorum could be entirely eliminated if the child was maintained at a temperature approximating that of the uterus, the coating of vernix not being removed. It was also noted that even heavy coats of vernix seemed to be absorbed by the skin of the infant in from eight to twelve hours following delivery. This finding led to the speculation that the vernix and perhaps the amniotic fluid might be important sources of nourishment to the fetus and newborn, and that the cholesterol content of the vernix might operate in the prevention of the hemolysis which causes the icterus.

The amniotic fluid is shown to be the product of the amniotic epithelium, which also secretes the grease of the vernix, the cells undergoing slow degenerative changes, and finally scaling off to form a part of the vernix and other greasy deposits on and beneath the amnion, in the fluid, and on the fetus. There is also elaborated protoplasmic or protein material, the nature of which is little understood. The skin of the fetus contributes to these substances only the desquamated epithelial cells, and perhaps a slight secretion from the sebaceous glands.

The high cholesterol content of the vernix seems to agree with the established conclusion that a large amount of cholesterol is furnished the fetus by the maternal blood stream and acts as an antagonist to certain toxic lipoids, as well as an antimicrobial agent. The author concludes that the cholesterol in the vernix is an important factor. Lanolin is suggested as an artificial substitute, meeting the requirements. Great stress is laid on the importance of putting the newborn infant instantly into a temperature approximating that of the uterus, and of allowing the vernix to be absorbed by the skin. GOODRICH C. SCHAUFFLER.

**Sakuma, H.:** *Supplementary Report of the Transportation of Coloring Substances into the Amniotic Fluid.* Japanese Journal of Obstetrics and Gynecology, 1927, x, 34 (June).

The results obtained in the author's experiments may be summed up as follows: (1) Out of seventeen acid and eight alkaline pigments, the following six passed into the amniotic fluid when injected into the ear vein of a gravid rabbit; trypan-red, trypan-blue, toluidin-blue, Congo-red, rose-Bengal, uranin. (2) The concentration of all the pigments in the amniotic fluid was weak. The highest was that of trypan-blue, which presented a concentration of 0.04 per cent five hours after injection. The other pigments showed merely a trace. (3) The time required for the passage of various pigments into the amniotic fluid indicates that the passage is very slow. (4) The pigments that positively pass into the fluid belong to the acid group. (5) The membranes, especially the amnion epithelium, are stained by trypan-blue, trypan-red, toluidin-blue, Congo-red, and rose-Bengal. The placenta is stained by these five positive pigments and by anilin-black; the umbilical cord by four positive pigments, namely, Congo-red, trypan-red, toluidin-blue and trypan-blue. The stains made by all of them are discernible with the naked eye. Trypan-blue can stain the stomach and the upper part of the intestines of the fetus light blue; this was the only recognizable case of the passage of pigment into the fetus. (6) Both in the case of the passage of pigment into the amniotic fluid and in the excretion of pigment by the mucous membrane of the normal uterus the results are the same with regard to the kind of pigments, the concentration of the pigments of passage, and the relative time required for the passage. (7) These facts indicate that the passage of pigment into the amniotic fluid is not brought about by the excretion of pigment on the part of the fetus, but occurs directly from the maternal body. J. P. GREENHILL.

## Correspondence

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### *To the Editor:*

Following publication of my article in the January issue, page 89, on a new type of breast funnel, I received a letter from Dr. Edward Lasker from which I take the following quotations.

"I noticed a few incorrect statements which were evidently due to the fact that not all pertinent data had been placed at your disposal. As I know you will be interested in a correction of these statements which have appeared under your name, I am giving you the proper data below and should appreciate your authorizing the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY to publish them.

"I am the original inventor of the electric breast pump, and I did the developing work at the request and under the guidance of Dr. I. A. Abt. . . . The first experiments with a breast attachment having a bulbous enlargement at the end of the funnel I made in 1922. . . .

"In your article you mention Keith as the originator of the water power pump with the bulbous enlargement. The Patent Office declared an interference with our application when the patent for which Keith had applied came up for examination and our priority was established in the proceedings."

I would appreciate it if you could publish this letter in justice to Dr. Lasker for it is not my intention to give credit to Dr. Abt or Dr. Keith that is due to Dr. Lasker, as he has pointed out to me.

F. P. McNALLEY.

ST. LOUIS, MO., FEBRUARY 13, 1928.

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### *To the Editor:*

In the February issue of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY of this year, I find a statement of Dr. H. D. Furniss in his discussion on Bullard and DuBois's report of a case of congenital dystopic pelvic kidney, which demands a reply.

Dr. Bullard stated in his paper that I had at times found it necessary on surgically readjusting the pelvic kidney to disentangle embarrassing renal blood vessels.

Dr. Furniss in his discussion warned his hearers of the danger involved in interfering with these blood vessels, stating that "the arteries that supply the kidney are all end arteries; there is no anastomosis between the different branches, and in disentangling these, if they have to be ligated, that much of the kidney substance is destroyed as the result of an infarct in the region supplied by these arteries." However true this may be in theory, it is not proved so in practice.

In a case reported by me before the American Gynecological Society in 1911, I disentangled vessels in the upper pole of a left dystopic kidney. The kidney was rotated so as to direct the hilum outward, and the accessory vessels held it in this position. In order to disentangle these vessels and allow the kidney to rotate into a normal position, it was necessary to sever and tie five or six branches, both on the proximal and on the distal sides, which entered the kidney. This kidney was not destroyed in part or in whole after replacement and continued to function normally. Its surgical replacement was a success as shown by roentgen examination.



In another case which came under my care, the kidney was held in the pelvis by two accessory arteries of considerable size. Both of these arteries had to be severed in order to replace the kidney in the lumbar region. The kidney met with no ill effects by the severing of the arteries, and its replacement was a success.

The third and most interesting case was one of double or fused kidney, which more than half filled the true pelvis, and prevented the uterus from rising. It could be felt above the plane of the anterior superior spine of the ilium. This seemed a hopeless case, as the vessels which supplied the lower portion of the fused mass passed under the kidney; around its external border; traversed its superior surface, and entered the lower hilum. These vessels prevented mobility, and I found it impossible to shift the fused mass from the lower to the upper pelvis until they were severed. When severed, I worked the fused mass into the false pelvis where it was successfully anchored.

This case is the best demonstration I can supply to show that these vessels can be severed without destruction to the kidney tissue and that the blood supply to the area cut off was secured from the upper vessel, as this patient had an uninterrupted recovery. She married within the year and gave birth to two children in the next three years. During the first six months of study, little or no urine came through the left ureter which drained the lower portion of the fused kidney, but this portion of the kidney functioned normally by the end of this time. How nature overcame the difficulties will have to be determined by one more skilled in physiology than I am.

DOUGAL BISSELL.

NEW YORK, MARCH 3, 1928.

## ITEM

### MEDICAL CENTER IN NEW YORK BEGINS OPERATIONS

#### SLOANE HOSPITAL FOR WOMEN, THE OBSTETRIC AND GYNECOLOGIC SERVICE OF THIS GROUP AND THE PRESBYTERIAN HOSPITAL

**D**URING the month of March the new Medical Center of New York received its first patients. In this are located the Sloane Hospital for Women, the Squier Urological Clinic, and the Presbyterian Hospital.

The Sloane Hospital, well known for many years as the obstetric teaching unit of Columbia University, has already been "booked" to full capacity for its opening at the Medical Center some time during April. This institution will occupy three floors of this twenty-two story Presbyterian Hospital structure. The building is E-shaped, wards of twelve beds each taking up the three horizontal bars of the E. In the new Sloane Hospital there are also wards of four, five, and two beds as well as single rooms. Multiple nurseries, and bathing rooms are provided for the babies. There is a special section for septic patients and another for infectious cases. The Labor and Operating Suites are on a floor connected with gynecologic beds. In the Labor Suite are eight sound-proof labor rooms and a small clinical amphitheater.

A specially designed "Sloane Maternity" floor of the Harkness Pavilion provides for the private patients.

Dr. Benjamin P. Watson, who was formerly at the Edinburgh University in Scotland, is the Director of the new Sloane Hospital and the successor of the late Dr. W. E. Studdiford.